

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549**

**Amendment No. 1
FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933**

4D Molecular Therapeutics, Inc.

(Exact name of Registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation or organization)

2836
(Primary Standard Industrial Classification Code Number)

47-3506994
(I.R.S. Employer Identification Number)

**5858 Horton Street #455
Emeryville, California 94608
(510) 505-2680**

(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

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Approximate date of commencement of proposed sale to the public: As soon as practicable after the effective date of this Registration Statement.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box.

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input checked="" type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input checked="" type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided to Section 7(a)(2)(B) of the Securities Act.

CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered	Amount to be Registered ⁽¹⁾	Proposed maximum aggregate offering price ⁽²⁾	Amount of registration fee ⁽³⁾
Common Stock, \$0.0001 par value per share	5,476,189	\$120,476,158	\$13,144

- (1) Includes 714,285 shares that the underwriters have an option to purchase.
 (2) Estimated solely for the purpose of computing the amount of the registration fee pursuant to Rule 457(a) under the Securities Act of 1933, as amended.
 (3) Of this amount, \$8,183 was previously paid.

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the Registration Statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

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The information contained in this preliminary prospectus is not complete and may be changed. We may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities and is not soliciting an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to Completion, Dated December 7, 2020

4,761,904 Shares



Common Stock

This is the initial public offering of shares of common stock of 4D Molecular Therapeutics, Inc. We are offering 4,761,904 shares of our common stock.

Prior to this offering, there has been no public market for our common stock. It is currently estimated that the initial public offering price will be between \$20.00 and \$22.00 per share.

We have applied to list our common stock on the Nasdaq Global Market under the symbol "FDMT."

We are an "emerging growth company" as defined under the federal securities laws and, as such, have elected to comply with certain reduced public company reporting requirements in this prospectus and may elect to do so in future filings.

See the section titled "[Risk Factors](#)" beginning on page 14 to read about factors you should consider before deciding to invest in shares of our common stock.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the accuracy or adequacy of this prospectus. Any representation to the contrary is a criminal offense.

	Per Share	Total
Initial public offering price	\$	\$
Underwriting discounts and commissions ⁽¹⁾	\$	\$
Proceeds, before expenses, to 4D Molecular Therapeutics, Inc.	\$	\$

(1) See the section titled "Underwriting" for a description of the compensation payable to the underwriters.

To the extent that the underwriters sell more than 4,761,904 shares of common stock, the underwriters have an option to purchase up to an additional 714,285 shares from us at the initial public offering price, less the underwriting discounts and commissions.

The underwriters expect to deliver the shares against payment in New York, New York on _____, 2020.

Goldman Sachs & Co. LLC

BofA Securities

Evercore ISI

Prospectus dated _____, 2020

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We and the underwriters have not authorized anyone to provide you any information other than that contained in this prospectus or in any free writing prospectus prepared by or on behalf of us or to which we have referred you. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. We and the underwriters are not making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted. You should assume that the information appearing in this prospectus is accurate only as of the date on the front cover page of this prospectus. Our business, financial condition, results of operations and prospects may have changed since that date.

For investors outside of the United States: we have not and the underwriters have not done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than the United States. Persons outside of the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the shares of common stock and the distribution of this prospectus outside of the United States.

4D Molecular Therapeutics™, Therapeutic Vector Evolution™, and our logo are some of our trademarks and tradenames used in this prospectus. This prospectus also includes trademarks, tradenames and service marks that are the property of other organizations. Solely for convenience, our trademarks and tradenames referred to in this prospectus may appear without the ® and ™ symbol, but those references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights, or the right of the applicable licensor to these trademarks and tradenames.

PROSPECTUS SUMMARY

This summary highlights information contained elsewhere in this prospectus and does not contain all of the information that you should consider in making your investment decision. Before deciding to invest in our common stock, you should read this entire prospectus carefully, including the sections of this prospectus titled “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our financial statements and related notes included elsewhere in this prospectus. Unless the context otherwise requires or as otherwise noted, references in this prospectus to the “company,” “4D Molecular Therapeutics” “4DMT,” “we,” “us” and “our” refer to 4D Molecular Therapeutics, Inc.

4D Molecular Therapeutics, Inc.

Overview

We are a clinical-stage gene therapy company pioneering the development of product candidates using our targeted and evolved AAV vectors. We seek to unlock the full potential of gene therapy using our platform, Therapeutic Vector Evolution, which combines the power of directed evolution with our approximately one billion synthetic capsid sequences to invent evolved vectors for use in targeted gene therapy products. Our targeted and evolved vectors are invented with the goal of being delivered through clinically routine, well-tolerated and minimally invasive routes of administration, of transducing diseased cells in target tissues efficiently, of having reduced immunogenicity and, where relevant, of having resistance to pre-existing antibodies. We believe these key features will help us to potentially create targeted gene therapy product candidates with improved therapeutic profiles, and to address a broad range of diseases from rare to large patient populations, including those that other gene therapies are unable to address. Each of our product candidates is created with one of our targeted and evolved AAV vectors. Our platform is designed to be modular, in that an evolved vector invented for a given set of diseases can be equipped with different transgene payloads to treat other diseases affecting the same tissue types. We believe this modularity will help inform the clinical development of subsequent product candidates using the same vector.

We have built a deep portfolio of gene therapy product candidates initially focused in three therapeutic areas: ophthalmology (intravitreal vector), cardiology (intravenous vector) and pulmonology (aerosol vector). We have three product candidates that are in clinical trials. We are developing 4D-125 for the treatment of X-linked retinitis pigmentosa (XLRP), currently in a Phase 1/2 clinical trial with initial clinical data expected in 2021. We are advancing 4D-110 for the treatment of choroideremia, currently in a Phase 1 clinical trial with initial clinical data expected in 2022. Roche holds an exclusive worldwide license to 4D-110 and has the exclusive option to in-license 4D-125 prior to initiation of pivotal clinical trials. We received FDA Fast Track designation for 4D-310 for the treatment of Fabry disease, which is currently in a Phase 1/2 clinical trial, with initial clinical data expected in 2021. Our two IND candidates are 4D-150 for the treatment of wet age-related macular degeneration (wet AMD), and 4D-710 for the treatment of cystic fibrosis lung disease. We expect to file the INDs and to initiate clinical trials for both of these programs in the second half of 2021.

We believe our competitive advantages, combined with our highly experienced team, help to position our company to create, develop, manufacture and, if approved, effectively commercialize targeted gene therapies that could transform the lives of patients suffering from debilitating diseases.

Our Therapeutic Vector Evolution Platform

Gene therapy holds tremendous promise as a transformative therapeutic class. However, the majority of gene therapies have encountered limitations such as inflammation and toxicity, high dose requirements, limited efficacy and neutralization by pre-existing antibodies, due in part to their utilization of conventional AAV vectors that are naturally occurring and non-targeted. Through our Therapeutic Vector Evolution platform, we apply the principles of directed evolution to invent targeted and evolved vectors for the delivery of genes to specific tissue types that are affected by the diseases that we are addressing. Our product candidates are designed and engineered to utilize our targeted and evolved vectors to potentially address the limitations encountered with gene therapies utilizing conventional AAV vectors.

Leveraging a wide range of molecular biology techniques, we have developed a collection of 40 distinct libraries that are comprised of approximately one billion synthetic capsid sequences. We next define a Target Vector Profile that identifies the optimal vector features for the specific tissue type(s) and related set of diseases we seek to target, with the goal of overcoming limitations encountered by conventional AAVs. We then deploy Therapeutic Vector Evolution with our capsid libraries in non-human primates (NHPs) and use competitive selection to identify targeted and evolved vectors from our libraries that demonstrate the strongest match to the Target Vector Profile.

Based on preclinical data reported to date from our NHP and human cell models, including preclinical head-to-head comparisons with relevant conventional AAV vectors, we have observed that our targeted and evolved vectors were well-tolerated and achieved enhanced delivery, increased transgene expression, reduced immunogenicity and/or improved antibody resistance when compared to conventional AAV vectors. We have not compared our targeted and evolved vectors to conventional AAV vectors in patients in clinical studies. As we advance through clinical trials, we plan to evaluate the following potential design features of our targeted and evolved vectors and product candidates:

- **Tolerability**: Well-tolerated therapies with a low inflammation profile, low dose requirements and routine, safe routes of delivery
- **Biologic activity**: Effective delivery to targeted tissues, efficient transgene expression in targeted tissues, and/or resistance to neutralization by pre-existing antibodies
- **Routine routes of administration**: Routine, well-tolerated and minimally invasive routes of administration, including intravitreal, aerosol and intravenous delivery
- **Antibody resistance**: Resistance to neutralization by pre-existing antibodies, translating into improved efficacy, larger addressable patient populations, and the potential for re-dosing

Our Product Candidate Pipeline

We are developing a diverse pipeline of product candidates for both rare and large market diseases, including patient populations that other gene therapies are unable to address. Our initial product candidates are focused on the following therapeutic areas: ophthalmology, cardiology and pulmonology. Each of our product candidates leverages a targeted and evolved vector we invented through our Therapeutic Vector Evolution platform. Below is a summary of our product candidate pipeline and our next anticipated milestones:

VECTOR Delivery	PRODUCT CANDIDATE	INDICATION	RESEARCH [§]	IND-ENABLING	PHASE 1	PHASE 2	PHASE 3	PRODUCT RIGHTS	
R100 Intravitreal	OPHTHALMOLOGY								
	4D-125	XLRP	Initial Data 2021						4DMT*
	4D-110	CHM	Initial Data 2022 [‡]						Roche
	4D-150	Wet AMD	Initiate Ph 1/2 2H-2021						4DMT
DR/DME								4DMT	
C102 IV	CARDIOLOGY								
	4D-310	Fabry Disease	Initial Data 2021						4DMT
A101 Aerosol	PULMONOLOGY								
	4D-710	Cystic Fibrosis	Initiate Ph 1/2 2H-2021						4DMT

* 4DMT is responsible for the development of this product candidate; Roche has an exclusive option to assume development and commercialization at its sole cost and expense. Such an option may be exercised prior to pivotal trial initiation.

[‡] Reporting in coordination with our partner Roche.

[§] The Research stage involves (1) defining the Target Vector Profile then deploying Therapeutic Vector Evolution with our capsid libraries in non-human primates (NHPs) and using competitive selection to identify targeted and evolved vectors from our libraries that demonstrate the strongest match to the Target Vector Profile; then (2) optimizing our product candidates using the lead vector by conducting in vivo and in vitro evaluation of various transgene and promoter construct candidates in cell and animal models, and the selection of at least one product candidate to move forward into IND-enabling studies.

Abbreviations: CHM, choroideremia; DR/DME, diabetic retinopathy, diabetic macular edema; IND, investigational new drug; IV, intravenous; Wet AMD, wet age-related macular degeneration; XLRP, x-linked retinitis pigmentosa.

Our Ophthalmology Programs: Intravitreal Product Candidates

We are developing product candidates to treat tissues throughout the retina. Our targeted and evolved AAV vector, R100, was invented for routine intravitreal injection, leading to transgene expression across the entire surface area of the retina, and in the major cell layers of the retina. We currently have four ophthalmology product candidates that utilize our proprietary intravitreal R100 vector:

- 4D-125:** 4D-125 is in an ongoing Phase 1/2 clinical trial in patients with XLRP due to mutations in the *RPGR* gene. XLRP is a rare inherited X-linked recessive genetic disorder that causes progressive vision loss and blindness in boys and young men. There are currently no approved therapies for XLRP. The estimated prevalence of XLRP due to *RPGR* variants is approximately 24,000 patients in the United States, and France, Germany, Italy, Spain and the United Kingdom (EU-5). We are enrolling patients with a broad range of disease severity, including those earlier in the progression of their disease. We expect to report initial clinical data from this trial in 2021. We currently hold worldwide commercialization rights for 4D-125, and Roche holds an exclusive option to in-license the product prior to pivotal trial initiation.

2. **4D-110:** 4D-110 is in an ongoing Phase 1 clinical trial in patients with choroideremia. Choroideremia is a monogenic blinding disease, affecting approximately 13,000 patients in the United States and EU-5. We are enrolling patients with a broad range of disease severity, including those earlier in the progression of their disease. In coordination with our partner Roche, we expect to report initial clinical data from this trial in 2022. We licensed exclusive worldwide rights to 4D-110 to Roche.
3. **4D-150:** 4D-150 is in IND-enabling preclinical development for wet AMD and diabetic retinopathy, two large market ophthalmology indications. There are on average 200,000 new incidences of wet AMD per year in the United States alone. As for diabetic retinopathy, including diabetic macular edema (DME), there are approximately 4.2 million adults in the United States that suffer from the disease and 655,000 have vision-threatening diabetic retinopathy. We wholly own this product candidate. We expect to file an IND and to initiate a Phase 1/2 clinical trial for 4D-150 in the second half of 2021.
4. **4D-135:** 4D-135 is in preclinical development for autosomal dominant retinitis pigmentosa (adRP) due to mutations in the *RHO* gene. The prevalence in the United States and EU-5 is estimated to be approximately 11,600. We wholly own this product candidate. We expect to initiate IND-enabling studies for 4D-135 in 2021.

Cardiology Pipeline: Intravenous Product Candidates

With our cardiology product candidates, all of which are wholly owned, we plan to treat patient populations in both primary cardiomyopathies, that involve the heart only, as well as cardiomyopathies that are secondary to systemic diseases, such as lysosomal storage diseases. Our cardiology product candidates utilize our targeted and evolved AAV vector, C102, which was invented for routine low dose intravenous administration and delivery to the heart, leading to transgene expression in heart muscle cells throughout the organ.

Our initial cardiology product candidate, 4D-310, is in an ongoing Phase 1/2 clinical trial in adult patients with classic (severe) Fabry disease. We estimate the potential initial addressable male Fabry patient population in the United States and EU-5 to be up to 19,000 individuals, approximately 57% of whom suffer from classic Fabry disease. 4D-310 is designed to address all critically affected organs, including the heart, kidney and blood vessels through direct intracellular transgene expression. To our knowledge, 4D-310 is the only Fabry product candidate specifically designed to treat cardiomyocytes. We expect to report initial clinical data from this trial in 2021.

Pulmonology Pipeline: Aerosol Delivery Product Candidates

With our pulmonology product candidates, all of which are wholly owned, we plan to treat diseases that affect the lungs. Our pulmonology product candidates utilize our targeted and evolved vector, A101, which was invented for aerosol delivery to all major regions within the lung, including airways and alveoli, and successful penetration of the mucus barrier for transduction of lung airway cells, overcoming potential barriers such as pre-existing AAV antibodies and other inhibitory proteins within the mucus barrier. Our products utilizing A101 are designed for delivery as an aerosol to the lung epithelial cell surface resulting in efficient airway and alveolar cell transduction and transgene expression.

Our initial pulmonology product candidate, 4D-710, is in IND-enabling preclinical development for cystic fibrosis lung disease. According to the Cystic Fibrosis Foundation, more than 30,000 people in the United States and more than 70,000 people worldwide are living with cystic fibrosis. We expect to file an IND and to initiate a Phase 1/2 clinical trial for 4D-710 in the second half of 2021.

Manufacturing

We have designed and are continually developing and scaling a robust in-house manufacturing platform for both GMP and non-GMP manufacturing. Our current in-house manufacturing capabilities include GMP manufacturing, production capabilities for IND-enabling GLP toxicology studies and research candidate production. Our team has manufactured over 140 total lots of AAV vectors for research or clinical use. We have in-house cGMP manufacturing capabilities for clinical trial material production. Our manufacturing team has completed and released multiple lots of clinical trial material for our three product candidates in clinical development. Our manufacturing facilities are on-site at our headquarters in Emeryville, California and include process development labs, an analytical development lab and a 3,200 square feet cGMP manufacturing facility.

Our Team

Our experienced team consists of biotherapeutics developers, entrepreneurs, innovative gene therapy scientists and clinicians to execute our platform, product design and development and commercialization strategies. Collectively, our team has more than 100 years of combined experience in the field of viral vector gene therapy, including leadership of over 30 clinical trials from Phase 1 through Phase 3 and product approval. We are led by our Chief Executive Officer and co-founder, David Kirm, M.D., who has over 25 years of experience creating and growing therapeutic platform companies. Our Executive Chairman, John Milligan, Ph.D., is the former CEO and President of Gilead Sciences. Our Chief Scientific Advisor and co-founder, David Schaffer, Ph.D., pioneered the application of directed evolution to the capsid of AAV vectors 20 years ago. Our Chief Operating Officer and Chief Technical Officer, Fred Kamal, Ph.D., has over 25 years of industry experience in product manufacturing and quality, including most recently with AveXis, Inc. where he was a key contributor to the development and biologics license application (BLA) for the AAV product Zolgensma. Our Chief Medical Officer, Robert S. Fishman, M.D., brings over 20 years of clinical trial execution and product development expertise.

Our Investors

We have raised \$175.4 million in net proceeds from the sale and issuance of securities to leading investors, including Viking Global Investors, Pfizer, The Biotechnology Value Fund, Mirae Asset Financial Group, Arrowmark Partners, Janus Henderson Investors, Casdin Capital, Cystic Fibrosis Foundation, Pappas Capital & Chiesi Ventures, Amzak Health, Perceptive Advisors, Ridgeback Capital Investments, Octagon Investments and Quad Investment Management.

Our Strategy

Our vision is to unlock the full potential of gene therapy to address as many patient populations as possible in both rare and large market diseases. We have developed the following strategies and guiding principles to achieve our goals:

- Invent targeted and evolved AAV vectors using the power of directed evolution to unlock the full potential of gene therapy with transformative gene therapy products.
- Apply our modular product design to help inform the clinical development of subsequent product candidates using the same vectors used for prior product candidates.
- Develop and commercialize a diverse portfolio of transformative gene therapy products in a broad range of therapeutic areas with significant unmet needs, including rare and large patient populations.

- Build a fully integrated biopharmaceutical company by advancing our capabilities in product development and commercialization, and by expanding our manufacturing facilities and internal proprietary Good Manufacturing Practice (GMP) capabilities.
- Selectively execute strategic collaborations to maximize the potential value of our Therapeutic Vector Evolution platform.

Risks Associated with Our Business

Our ability to implement our business strategy is subject to numerous risks that you should be aware of before making an investment decision. These risks are described more fully in the section titled "Risk Factors," immediately following this prospectus summary. These risks include the following, among others:

- We are in the early stages of drug development and have a very limited operating history and no products approved for commercial sale, which may make it difficult to evaluate our current business and predict our future success and viability.
- We have had recurring net losses, and we expect to continue to incur significant net losses for the foreseeable future.
- Even if this offering is successful, we will require substantial additional capital to finance our operations. If we fail or are unable to raise such capital when needed, or on acceptable terms, we may be forced to delay, reduce and/or eliminate one or more of our research and drug development programs, future commercialization efforts or other operations.
- All of our product candidates are based on a novel AAV gene therapy technology with which there is limited regulatory and clinical experience to date, which makes it difficult to predict the time and cost of product candidate development and subsequently obtaining regulatory approval. Further, the regulatory approval process for novel product candidates such as ours can be more expensive and take longer than for other, better known or extensively studied therapeutic modalities.
- Gene therapies are novel, complex and difficult to manufacture. We could experience production problems that result in delays in our development or commercialization programs, limit the supply of our products or otherwise seriously harm our business.
- Adverse public perception or regulatory scrutiny of gene therapy technology may negatively impact the developmental progress or commercial success of products that we develop alone or with collaborators.
- Our clinical trials may fail to demonstrate substantial evidence of the safety and efficacy of our product candidates, which would prevent, delay or limit the scope of regulatory approval and commercialization.
- The regulatory approval processes of the FDA, EMA and comparable foreign regulatory authorities are lengthy, expensive, time consuming, and inherently unpredictable. If we are ultimately unable to obtain regulatory approval for our product candidates, we will be unable to generate product revenue and our business will be substantially harmed.
- Our employees, independent contractors, consultants, research or commercial partners or collaborators and vendors may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements.
- Our success depends on our ability to protect our intellectual property and our proprietary technologies.

- Our rights to develop and commercialize our product candidates are subject in part to the terms and conditions of licenses granted to us by others, and the patent protection, prosecution and enforcement for some of our product candidates may be dependent on our licensors.
- We concluded that there is substantial doubt relating to our ability to continue as a going concern for at least one year from the date that our financial statements for the year ended December 31, 2019 were available for reissuance, and our independent registered public accounting firm has included an explanatory paragraph relating to our ability to continue as a going concern in its report on our financial statements included in this prospectus.

Corporate Information

We were formed on September 12, 2013 as a Delaware limited liability corporation under the name 4D Molecular Therapeutics, LLC. On March 11, 2015, 4D Molecular Therapeutics, Inc. was incorporated as a Delaware corporation. On March 20, 2015, 4D Molecular Therapeutics, LLC merged with 4D Molecular Therapeutics, Inc., with 4D Molecular Therapeutics, Inc. being the surviving entity. Our principal executive offices are located at 5858 Horton Street #455, Emeryville, California 94608, and our telephone number is (510) 505-2680. Our website address is www.4dmoleculartherapeutics.com. The information on, or that can be accessed through, our website is not part of this prospectus. We have included our website address as an inactive textual reference only.

Implications of Being an Emerging Growth Company and a Smaller Reporting Company

We are an emerging growth company as defined in the Jumpstart Our Business Startups Act of 2012 (the JOBS Act). We will remain an emerging growth company until the earlier of (i) the last day of the year following the fifth anniversary of the completion of this offering, (ii) the last day of the year in which we have total annual gross revenue of at least \$1.07 billion, (iii) the last day of the year in which we are deemed to be a "large accelerated filer" as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended (the Exchange Act), which would occur if the market value of our common stock held by non-affiliates exceeded \$700.0 million as of the last business day of the second fiscal quarter of such year or (iv) the date on which we have issued more than \$1.0 billion in non-convertible debt securities during the prior three-year period. An emerging growth company may take advantage of specified reduced reporting requirements and is relieved of certain other significant requirements that are otherwise generally applicable to public companies. As an emerging growth company:

- we will present only two years of audited financial statements, plus unaudited financial statements for any interim period, and related management's discussion and analysis of financial condition and results of operations;
- we will avail ourselves of the exemption from the requirement to obtain an attestation and report from our auditors on the assessment of our internal control over financial reporting pursuant to the Sarbanes-Oxley Act of 2002 (the Sarbanes-Oxley Act);
- we will provide less extensive disclosure about our executive compensation arrangements;
- we will not require stockholder non-binding advisory votes on executive compensation or golden parachute arrangements; and
- we will take advantage of extended transition periods to comply with new or revised accounting standards, delaying the adoption of these accounting standards until they would apply to private companies.

We are also a “smaller reporting company” as defined in the Securities and Exchange Act. We may continue to be a smaller reporting company even after we are no longer an emerging growth company. We may take advantage of certain of the scaled disclosures available to smaller reporting companies and will be able to take advantage of these scaled disclosures for so long as the market value of our voting and non-voting common stock held by non-affiliates is less than \$250.0 million measured on the last business day of our second fiscal quarter, or our annual revenue is less than \$100.0 million during the most recently completed fiscal year and the market value of our voting and non-voting common stock held by non-affiliates is less than \$700.0 million measured on the last business day of our second fiscal quarter.

As a result, the information in this prospectus and that we provide to our investors in the future may be different than what you might receive from other public reporting companies.

The Offering

Common stock offered by us	4,761,904 shares.
Underwriters' option to purchase additional shares	We have granted the underwriters a 30-day option to purchase up to 714,285 additional shares of our common stock.
Common stock to be immediately outstanding after the offering	21,595,630 shares (or 22,309,915 shares if the underwriters exercise their option to purchase additional shares in full).
Use of proceeds	<p>We estimate that the net proceeds from this offering will be approximately \$89.9 million, or approximately \$103.9 million if the underwriters exercise their option to purchase additional shares in full, assuming an initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.</p> <p>We currently intend to use the net proceeds from this offering, together with our existing cash and cash equivalents, to fund the ongoing and planned clinical and preclinical development of our product candidates, the further development and expansion of our pipeline, the continued expansion of our manufacturing capabilities and facilities and the remainder for working capital and other general corporate purposes. See the section titled "Use of Proceeds" for a more complete description of the intended use of proceeds from this offering.</p>
Risk factors	See the section titled "Risk Factors" and other information included in this prospectus for a discussion of factors that you should consider carefully before deciding to invest in our common stock.
Proposed Nasdaq Global Market trading symbol	"FDMT."

The number of shares of our common stock to be outstanding after this offering is based on 16,833,726 shares of our common stock (including our redeemable convertible preferred stock on an as-converted basis) outstanding as of September 30, 2020, and excludes:

- 2,928,321 shares of our common stock issuable upon the exercise of stock options to purchase common stock that were outstanding as of September 30, 2020, with a weighted-average exercise price of \$9.11 per share;
- 68,669 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted-average exercise price of \$1.85 per share;

- 499,000 shares of our common stock issuable upon the exercise of stock options to purchase common stock that were granted after September 30, 2020, each with an exercise price of \$18.66 per share;
- 30,000 shares of our common stock issuable upon the exercise of a warrant to purchase common stock that was issued after September 30, 2020, with an exercise price of \$18.00 per share;
- 41,897 shares of our common stock reserved for issuance pursuant to future awards under our 2015 Equity Incentive Plan (the Plan) and associated amendments as of September 30, 2020;
- 2,315,498 shares of our common stock reserved for issuance pursuant to future awards under our 2020 Equity Incentive Award Plan (the 2020 Plan), as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the completion of this offering; and
- 215,956 shares of our common stock reserved for issuance pursuant to future awards under our 2020 Employee Stock Purchase Plan (the ESPP), as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the completion of this offering.

In addition, unless we specifically state otherwise, all information in this prospectus reflects and assumes the following:

- the automatic conversion of 11,575,984 shares of our outstanding redeemable convertible preferred stock as of September 30, 2020 into an equivalent number of shares of our common stock immediately prior to the completion of this offering;
- the filing and effectiveness of our amended and restated certificate of incorporation in Delaware and the adoption of our amended and restated bylaws, each of which will occur immediately prior to the completion of this offering;
- no exercise of outstanding stock options or warrants described above; and
- no exercise of the underwriters' option to purchase additional shares.

Unless otherwise specified and unless the context otherwise requires, we refer to our Series A, Series A-1, Series B and Series C redeemable convertible preferred stock collectively as redeemable convertible preferred stock in this prospectus, as well as for financial reporting purposes and in the financial tables included elsewhere in this prospectus, as more fully explained in Note 10 to our financial statements included elsewhere in this prospectus.

Summary Financial Data

The following tables summarize our financial data for the periods and as of the dates indicated. We derived the summary statements of operations and comprehensive loss data for the years ended December 31, 2018 and 2019 from our audited financial statements included elsewhere in this prospectus. We derived the summary statements of operations and comprehensive loss data for the nine months ended September 30, 2019 and 2020 and the summary balance sheet data as of September 30, 2020 from our unaudited interim financial statements that are included elsewhere in this prospectus. Our unaudited interim financial statements are prepared in accordance with U.S. generally accepted accounting principles (GAAP) on the same basis as our audited financial statements and include, in the opinion of management, all adjustments, consisting of normal recurring adjustments, that are necessary for the fair statement of the financial information set forth in those financial statements. Our historical results are not necessarily indicative of the results that may be expected in the future and our historical results for the nine months ended September 30, 2020 are not necessarily indicative of the results that may be expected for the remainder of 2020.

You should read this data together with our financial statements and related notes included elsewhere in this prospectus and the information under the sections titled “Selected Financial Data” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

	Year Ended December 31,		Nine Months Ended September 30,	
	2018	2019	2019	2020
(in thousands, except share and per share data)				
Statements of Operations and Comprehensive Loss				
Data:				
Revenue:				
Collaboration and license revenue	\$ 8,987	\$ 6,960	\$ 4,930	\$ 14,340
Collaboration and license revenue, related parties	5,143	26	26	249
Total revenue	<u>14,130</u>	<u>6,986</u>	<u>4,956</u>	<u>14,589</u>
Operating expenses:				
Research and development	18,362	38,718	26,359	40,433
Acquired in-process research and development	—	5,137	5,137	—
General and administrative	6,167	13,895	7,936	10,398
Total operating expenses	<u>24,529</u>	<u>57,750</u>	<u>39,432</u>	<u>50,831</u>
Loss from operations	(10,399)	(50,764)	(34,476)	(36,242)
Other income (expense)	848	1,458	1,285	96
Net loss and comprehensive loss	<u>\$ (9,551)</u>	<u>\$ (49,306)</u>	<u>\$ (33,191)</u>	<u>\$ (36,146)</u>
Net loss per share attributable to common stockholders, basic and diluted ⁽¹⁾	<u>\$ (1.89)</u>	<u>\$ (9.59)</u>	<u>\$ (6.46)</u>	<u>\$ (6.97)</u>
Weighted-average shares outstanding used in computing net loss per share attributable to common stockholders, basic and diluted ⁽¹⁾	<u>5,049,203</u>	<u>5,142,560</u>	<u>5,135,622</u>	<u>5,188,628</u>
Pro forma net loss per share, basic and diluted ⁽¹⁾		<u>\$ (3.94)</u>		<u>\$ (2.44)</u>
Weighted-average shares outstanding used in computing pro forma net loss per share, basic and diluted ⁽¹⁾		<u>12,518,191</u>		<u>14,835,343</u>

(1) See Notes 2 and 14 to our financial statements included elsewhere in this prospectus for an explanation of the calculations of our basic and diluted net loss per share attributable to common stockholders, pro forma net loss per share, and the weighted-average number of shares of our common stock used in the computation of the per share amounts.

	As of September 30, 2020		
	Actual	Pro Forma ⁽¹⁾	Pro Forma As Adjusted ⁽²⁾⁽³⁾
	(in thousands)		
Balance Sheet Data:			
Cash and cash equivalents	\$ 88,755	\$ 88,755	\$ 178,675
Working capital ⁽⁴⁾	78,258	78,258	168,231
Total assets	98,192	98,192	188,039
Redeemable convertible preferred stock	175,448	—	—
Accumulated deficit	(115,132)	(115,132)	(115,132)
Total stockholders' (deficit) equity	(105,292)	70,156	160,056

(1) The pro forma column in the balance sheet data table above gives effect to (i) the automatic conversion of 11,575,984 shares of our outstanding redeemable convertible preferred stock as of September 30, 2020 into an equivalent number of shares of our common stock immediately prior to the completion of this offering; and (ii) the filing and effectiveness of our amended and restated certificate of incorporation, which will occur, in each case, immediately prior to the completion of this offering.

(2) The pro forma as adjusted column in the balance sheet data table above gives effect to (i) the pro forma adjustments set forth in footnote (1) above and (ii) the sale and issuance of shares of our common stock in this offering, assuming an initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

(3) Each \$1.00 increase or decrease in the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, each of the amount of our cash and cash equivalents, working capital, total assets and total stockholders' (deficit) equity by \$4.4 million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discount and commissions and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. Each increase or decrease of 1.0 million in the number of shares we are offering would increase or decrease, as applicable, each of the amount of our cash and cash equivalents, working capital, total assets and total stockholders' (deficit) equity by \$19.5 million, assuming the assumed initial public offering price per share, as set forth on the cover page of this prospectus, remains the same. The pro forma as adjusted information is illustrative only and we will adjust this information based on the actual initial public offering price and other terms of this offering determined at pricing.

(4) We define working capital as current assets less current liabilities. See our financial statements and related notes included elsewhere in this prospectus for further details regarding our current assets and current liabilities.

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the risks described below, as well as the other information in this prospectus, including our financial statements and the related notes and the section of this prospectus titled "Management's Discussion and Analysis of Financial Condition and Results of Operations," before deciding whether to invest in our common stock. If any of the following risks actually occurs, our business, reputation, financial condition, results of operations, revenue and future prospects could be seriously harmed. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties that we are unaware of, or that we currently believe are not material, may also become important factors that adversely affect our business. Unless otherwise indicated, references to our business being seriously harmed in these risk factors and elsewhere will include harm to our business, reputation, financial condition, results of operations, future prospects and stock price. In that event, the market price of our common stock could decline, and you could lose part or all of your investment.

Risks Related to Our Limited Operating History, Financial Condition and Capital Requirements

We are in the early stages of drug development and have a very limited operating history and no products approved for commercial sale, which may make it difficult to evaluate our current business and predict our future success and viability.

We are a clinical-stage gene therapy company pioneering the development of product candidates using our targeted and evolved AAV vectors. We commenced operations in September 2013, have no products approved for commercial sale and have not generated any product revenue. Drug development is a highly uncertain undertaking and involves a substantial degree of risk. If our product candidates are not successfully developed and approved, we may never generate any revenue. To date, we have not completed any clinical trials (including any pivotal clinical trial), obtained marketing approval for any product candidates, manufactured commercial scale quantities of any of our product candidates or arranged for a third party to do so on our behalf, or conducted sales and marketing activities necessary for successful product commercialization. Our limited operating history as a company and early stage of drug development make any assessment of our future success and viability subject to significant uncertainty. We will encounter risks and difficulties frequently experienced by early-stage biopharmaceutical companies in rapidly evolving fields, and we have not yet demonstrated an ability to successfully overcome such risks and difficulties. If we do not address these risks and difficulties successfully, our business will be seriously harmed.

We have had recurring net losses, and we expect to continue to incur significant net losses for the foreseeable future.

We have incurred recurring net losses, including net losses of \$9.6 million and \$49.3 million for the years ended December 31, 2018 and 2019, respectively, and \$33.2 million and \$36.1 million for the nine months ended September 30, 2019 and September 30, 2020, respectively. As of September 30, 2020, we had an accumulated deficit of \$115.1 million.

We have devoted substantially all of our financial resources and efforts on research and development activities, including for our product candidates and our Therapeutic Vector Evolution platform. We do not expect to generate revenue from product sales for several years, if at all. We continue to incur significant research and development and other expenses related to our ongoing operations. The amount of our future net losses will depend, in part, on the level of our future expenditures and our ability to generate revenue. Moreover, our net losses may fluctuate significantly from quarter to quarter and year to year, such that a period-to-period comparison of our results of operations may not be a good indication of our future performance.

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We expect to continue to incur significant and increasingly higher expenses and operating losses for the foreseeable future. We anticipate that our expenses will increase substantially if and as we:

- progress our current and any future product candidates through preclinical and clinical development;
- experience delays in our preclinical studies and clinical trials, whether current or planned, due to the novel coronavirus (COVID-19) pandemic, or other factors;
- expand our manufacturing facilities and work with our contract manufacturers to scale up the manufacturing processes for our product candidates;
- continue our research and discovery activities;
- continue the development of our Therapeutic Vector Evolution platform;
- initiate and conduct additional preclinical, clinical or other studies for our product candidates;
- change or add additional contract manufacturers or suppliers;
- seek regulatory approvals and marketing authorizations for our product candidates;
- establish sales, marketing and distribution infrastructure to commercialize any products for which we obtain approval;
- acquire or in-license product candidates, intellectual property and technologies;
- make milestone, royalty or other payments due under any current or future collaboration or license agreements;
- obtain, maintain, expand, protect and enforce our intellectual property portfolio;
- attract, hire and retain qualified personnel;
- experience any delays or encounter other issues related to our operations;
- meet the requirements and demands of being a public company;
- defend against any product liability claims or other lawsuits related to our products; and
- the impact of the COVID-19 pandemic, which may exacerbate the magnitude of the factors discussed above.

Our prior losses and expected future losses have had and will continue to have an adverse effect on our stockholders' deficit and working capital. In any particular quarter or quarters, our operating results could be below the expectations of securities analysts or investors, which could cause our stock price to decline.

Even if this offering is successful, we will require substantial additional capital to finance our operations. If we fail or are unable to raise such capital when needed, or on acceptable terms, we may be forced to delay, reduce and/or eliminate one or more of our research and drug development programs, future commercialization efforts or other operations.

Developing biopharmaceutical products, including conducting preclinical studies and clinical trials, is a very time consuming, expensive and uncertain process that takes years to complete. Our operations have required substantial amounts of cash since inception. To date, we have financed our operations primarily through the sale of equity securities, and to a lesser extent from cash received pursuant to our collaboration and license agreements. We have initiated clinical trials, which are ongoing, and have several other product candidates in preclinical development that may enter clinical development shortly thereafter. Developing our product candidates is expensive, and we expect to

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continue to spend substantial amounts as we fund our early stage research projects, continue preclinical and clinical development of our product candidates and, in particular, advance our product candidates through clinical trials. Even if we are successful in developing our product candidates, obtaining regulatory approvals and launching and commercializing any product candidate will require substantial additional funding beyond the net proceeds of this offering.

As of September 30, 2020, we had \$88.8 million in cash and cash equivalents. Based on our current operating plan, we estimate that our existing cash and cash equivalents, together with the anticipated net proceeds from this offering, will be sufficient to fund our operating expenses and capital expenditure requirements at least into the fourth quarter of 2022. Our estimate as to how long we expect our existing cash and cash equivalents to be available to fund our operations is based on assumptions that may prove inaccurate, and we could use our available capital resources sooner than we currently expect. In addition, changing circumstances may cause us to increase our spending significantly faster than we currently anticipate, and we may need to spend more money than currently expected because of circumstances beyond our control. We may need to raise additional funds sooner than we anticipate if we choose to expand more rapidly than we presently anticipate.

Additional funds may not be available when we need them, on terms that are acceptable to us, or at all. Our ability to raise additional capital may be adversely impacted by potential worsening global economic conditions and the recent disruptions to and volatility in the credit and financial markets in the United States and worldwide resulting from the ongoing COVID-19 pandemic. If adequate funds are not available to us on a timely basis, we may be required to:

- delay, limit, reduce or terminate preclinical studies, clinical trials or other research and development activities or eliminate one or more of our development programs altogether; or
- delay, limit, reduce or terminate our efforts to establish manufacturing and sales and marketing capabilities or other activities that may be necessary to commercialize our product candidates, or reduce our flexibility in developing or maintaining our sales and marketing strategy.

We also could be required to seek funds through arrangements with collaborators or others that may require us to relinquish rights to, or jointly own some aspects of, our product candidates or technologies that we would otherwise pursue on our own. We do not expect to realize revenue from sales of products or royalties from licensed products in the foreseeable future, if at all, and unless and until a product candidate is clinically tested, approved for commercialization and successfully marketed.

We will be required to seek additional funding in the future and currently intend to do so through collaborations, public or private equity offerings or debt financings, credit or loan facilities or a combination of one or more of these funding sources. Our ability to raise additional funds will depend on financial, economic and other factors, many of which are beyond our control. Additional funds may not be available to us on acceptable terms or at all. If we raise additional funds by issuing equity securities, our stockholders will suffer dilution and the terms of any financing may adversely affect the rights of our stockholders. In addition, as a condition to providing additional funds to us, future investors may demand, and may be granted, rights superior to those of existing stockholders. Debt financing, if available, is likely to involve restrictive covenants limiting our flexibility in conducting future business activities, and, in the event of insolvency, debt holders would be repaid before holders of our equity securities received any distribution of our corporate assets.

If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us, we may have to significantly delay, scale back or discontinue the development or commercialization of one or more of our product candidates or one or more of our other research and development initiatives. Any of the above events could seriously harm our business and cause the price of our common stock to decline.

Due to the significant resources required for the development of our product candidates, and depending on our ability to access capital, we must prioritize development of certain product candidates. Moreover, we may expend our limited resources on product candidates that do not yield a successful product and fail to capitalize on product candidates or indications that may be more profitable or for which there is a greater likelihood of success.

Due to the significant resources required for the development of our product candidates, in particular our product candidates in IND-enabling studies and those in clinical trials, we must decide which product candidates and indications to pursue and advance and the amount of resources to allocate to each. Our decisions concerning the allocation of research, development, collaboration, management and financial resources toward particular product candidates or therapeutic areas may not lead to the development of any viable commercial product and may divert resources away from better opportunities. Similarly, our potential decisions to delay, terminate or collaborate with third parties in respect of certain product candidates may subsequently also prove to be less than optimal and could cause us to miss valuable opportunities. If we make incorrect determinations regarding the viability or market potential of any of our product candidates or misread trends in the biopharmaceutical industry, in particular for ophthalmology, cardiology and pulmonology diseases, our business could be seriously harmed. As a result, we may fail to capitalize on viable commercial products or profitable market opportunities, be required to forego or delay pursuit of opportunities with other product candidates or other diseases that may later prove to have greater commercial potential than those we choose to pursue, or relinquish valuable rights to such product candidates through collaboration, licensing or other royalty arrangements in cases in which it would have been advantageous for us to invest additional resources to retain sole development and commercialization rights.

The amount of our future losses is uncertain and our quarterly operating results may fluctuate significantly or may fall below the expectations of investors or securities analysts, each of which may cause our stock price to fluctuate or decline.

Our quarterly and annual operating results may fluctuate significantly, which makes it difficult for us to predict our future operating results. These fluctuations may occur due to a variety of factors, many of which are outside of our control and may be difficult to predict, including:

- the timing and success or failure of preclinical studies and clinical trials for our product candidates or competing product candidates, or any other change in the competitive landscape of our industry, including consolidation among our competitors or collaboration partners;
- the timing and cost of, and level of investment in research, development and commercialization activities, which may change from time to time;
- the timing of receipt of approvals from regulatory authorities in the United States and internationally;
- the timing and status of enrollment and safety and efficacy readouts for our clinical trials;
- the cost of manufacturing, as well as building out our supply chain, which may vary depending on the quantity of production, the cost of continuing to establish and scale up our internal manufacturing capabilities, and the terms of any agreements we enter into with third-party suppliers;
- timing and amount of any option, milestone, royalty or other payments due under any current or future collaboration or license agreement;
- coverage and reimbursement policies with respect to our gene therapy product candidates and potential future drugs that compete with our products, if approved;
- expenditures that we may incur to acquire, develop or commercialize additional products and technologies;

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- the level of demand for our gene therapy products, if approved, which may vary significantly over time; and
- future accounting pronouncements or changes in our accounting policies.

For example, we expect that most of our collaboration and license revenue for the year ended December 31, 2020 will be from Roche. The cumulative effects of these factors could result in large fluctuations and unpredictability in our quarterly and annual operating results. As a result, comparing our operating results on a period-to-period basis may not be meaningful. Investors should not rely on our past results as an indication of our future performance.

This variability and unpredictability could also result in our failing to meet the expectations of financial analysts or investors for any period. If our revenue or operating results fall below the expectations of analysts or investors or below any forecasts we may provide to the market, or if the forecasts we provide to the market are below the expectations of analysts or investors, the price of our common stock could decline substantially. Such a stock price decline could occur even when we have met any previously publicly stated revenue or earnings guidance we may provide.

We concluded that there is substantial doubt relating to our ability to continue as a going concern for at least one year from the date that our financial statements for the year ended December 31, 2019 were available for reissuance, and our independent registered public accounting firm has included an explanatory paragraph relating to our ability to continue as a going concern in its report on our financial statements included in this prospectus.

Our report from our independent registered public accounting firm for the year ended December 31, 2019 includes an explanatory paragraph stating that our recurring losses and negative cash flows from operations raise substantial doubt about our ability to continue as a going concern. Our financial statements do not include any adjustments that may result from the outcome of this uncertainty. If we are unable to obtain sufficient funding, our business, prospects, financial condition and results of operations will be materially and adversely affected and we may be unable to continue as a going concern. If we are unable to continue as a going concern, we may have to liquidate our assets and may receive less than the value at which those assets are carried on our audited financial statements, and it is likely that investors would lose part or all of their investment. Future reports from our independent registered public accounting firm may also contain statements expressing substantial doubt about our ability to continue as a going concern. If there remains substantial doubt about our ability to continue as a going concern, investors or other financing sources may be unwilling to provide additional funding to us on commercially reasonable terms, or at all, and our business may be harmed.

Risks Related to the Research, Discovery, Development and Commercialization of Our Product Candidates

All of our product candidates are based on a novel AAV gene therapy technology with which there is limited regulatory and clinical experience to date, which makes it difficult to predict the time and cost of product candidate development and subsequently obtaining regulatory approval. Further, the regulatory approval process for novel product candidates such as ours can be more expensive and take longer than for other, better known or extensively studied therapeutic modalities.

All of our product candidates are based on gene therapy technology and our future success depends on the successful development of this novel therapeutic approach. We cannot assure you that any development problems we or other gene therapy companies experience in the future related to gene therapy technology will not cause significant delays or unanticipated costs in the development of our product candidates, or that such development problems can be solved. In addition, the clinical study requirements of the U.S. Food and Drug Administration (FDA) and other regulatory agencies and

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the criteria these regulators use to determine the safety and efficacy of a product candidate vary substantially according to the type, complexity, novelty and intended use and market of the potential products. The regulatory approval process for novel product candidates such as ours can be more expensive and take longer than for other, better known or extensively studied therapeutic modalities. Further, as we are developing novel treatments for diseases in which there is limited clinical experience with new endpoints and methodologies, there is heightened risk that the FDA, European Medicines Agency (EMA) or comparable foreign regulatory bodies may not consider the clinical trial endpoints to provide clinically meaningful results, and the resulting clinical data and results may be more difficult to analyze. To date, few gene therapy products have been approved by the FDA or comparable foreign regulatory authorities, which makes it difficult to determine how long it will take or how much it will cost to obtain regulatory approvals for our product candidates in the United States, the European Union or other jurisdictions. Further, approvals by one regulatory agency may not be indicative of what other regulatory agencies may require for approval.

Regulatory requirements governing gene therapy products have evolved and may continue to change in the future. For example, the FDA established the Office of Tissues and Advanced Therapies within its Center for Biologics Evaluation and Research (CBER) to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its review. These and other regulatory review agencies, committees and advisory groups and the requirements and guidelines they promulgate may lengthen the regulatory review process, require us to perform additional preclinical studies or clinical trials, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of these treatment candidates or lead to significant post-approval limitations or restrictions.

Under the National Institutes of Health (NIH) Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines), supervision of human gene transfer trials, including evaluation and assessment by an Institutional Biosafety Committee (IBC) a local institutional committee that reviews and oversees research utilizing recombinant or synthetic nucleic acid molecules at that institution, is required. The IBC assesses the safety of the research and identifies any potential risk to the public health or the environment, and such review may result in some delay before initiation of a clinical trial. While the NIH Guidelines are not mandatory unless the research in question is being conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH Guidelines voluntarily follow them.

We are subject to significant regulatory oversight by the FDA, and in addition to the government regulators, the applicable IBC and Institutional Review Board (IRB), of each institution at which we or our collaborators conduct clinical trials of our product candidates, or a central IRB if appropriate, would need to review and approve the proposed clinical trial.

Similarly, the EMA governs the development of gene therapies in the European Union and may issue new guidelines concerning the development and marketing authorization for gene therapy products and require that we comply with these new guidelines.

Changes in applicable regulatory guidelines may lengthen the regulatory review process, require us to perform additional studies or trials, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of our product candidates or lead to significant post-approval limitations or restrictions.

As we advance our product candidates, we will be required to consult with these regulatory and advisory groups and comply with applicable guidelines. If we fail to do so, we may be required to delay

or discontinue development of such product candidates. These additional processes may result in a review and approval process that is longer than we otherwise would have expected. Delays as a result of an increased or lengthier regulatory approval process or further restrictions on the development of our product candidates can be costly and could negatively impact our ability to complete clinical trials and commercialize our current and future product candidates in a timely manner, if at all.

Adverse public perception or regulatory scrutiny of gene therapy technology may negatively impact the developmental progress or commercial success of product candidates that we develop alone or with collaborators.

The developmental and commercial success of our current product candidates, or any that we develop alone or with collaborators in the future, will depend in part on public acceptance of the use of gene therapy technology, including the use of AAVs, for the prevention or treatment of human diseases. Adverse public perception of gene therapies may negatively impact our ability to raise capital or enter into strategic agreements for the development of product candidates.

Gene therapy remains a novel technology. The commercial success of our gene therapy products, if successfully developed and approved, may be adversely affected by claims that gene therapy is unsafe, unethical or immoral. This may lead to unfavorable public perception and the inability of any of our product candidates to gain the acceptance of the public or the medical community. Unfavorable public perceptions may also adversely impact our or our collaborators' ability to enroll clinical trials for our product candidates. Moreover, success in commercializing any product candidates that receive regulatory approval will depend upon physicians prescribing, and their patients being willing to receive, treatments that involve the use of such product candidates in lieu of, or in addition to, existing treatments with which they are already familiar and for which greater clinical data may be available.

Publicity of any adverse events in, or unfavorable results of, preclinical studies or clinical trials for any current or future product candidates, or with respect to the studies or trials of our competitors or of academic researchers utilizing similar technologies, even if not ultimately attributable to our technology or product candidates, could negatively influence public opinion. Negative public perception about the use of AAV technology in human therapeutics, whether related to our technology or a competitor's technology, could result in increased governmental regulation, delays in the development and commercialization of product candidates or decreased demand for the resulting products, any of which may seriously harm our business.

Our product candidates may cause undesirable side effects or have other properties that could halt their clinical development, prevent their regulatory approval, limit their commercial potential or result in significant negative consequences.

Adverse events or other undesirable side effects caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other comparable foreign regulatory authorities.

During the conduct of clinical trials, patients report changes in their health, including illnesses, injuries, and discomforts, to their study doctor. Often, it is not possible to determine whether or not the product candidate being studied caused these conditions. It is possible that as we test our product candidates in larger, longer and more extensive clinical trials, or as use of these product candidates becomes more widespread if they receive regulatory approval, illnesses, injuries, discomforts and other adverse events that were observed in previous trials, as well as conditions that did not occur or went undetected in previous trials, will be reported by patients. Many times, side effects are only detectable

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after investigational products are tested in large-scale, Phase 3 clinical trials or, in some cases, after they are made available to patients on a commercial scale after approval.

If any serious adverse events occur, clinical trials or commercial distribution of any product candidates or products we develop alone or with collaborators could be suspended or terminated, and our business could be seriously harmed. Treatment-related side effects could also affect patient recruitment and the ability of enrolled patients to complete the trial or result in potential liability claims. Regulatory authorities could order us or our collaborators to cease further development of, deny approval of, or require us to cease selling any product candidates or products for any or all targeted indications. If we or our collaborators elect, or are required, to delay, suspend or terminate any clinical trial or commercialization efforts, the commercial prospects of such product candidates or products may be harmed, and our ability to generate product revenues from them or other product candidates that we develop may be delayed or eliminated. Additionally, if one or more of our product candidates receives marketing approval, and we or others later identify undesirable side effects or adverse events caused by such products, a number of potentially significant negative consequences could result, including but not limited to:

- regulatory authorities may suspend, limit or withdraw approvals of such product, or seek an injunction against its manufacture or distribution;
- regulatory authorities may require additional warnings on the label including “boxed” warnings, or issue safety alerts, Dear Healthcare Provider letters, press releases or other communications containing warnings or other safety information about the product;
- we may be required to change the way the product is administered or conduct additional clinical trials or post-approval studies;
- we may be required to create a Risk Evaluation and Mitigation Strategy (REMS), which could include a medication guide outlining the risks of such side effects for distribution to patients, a communication plan for healthcare providers and/or other elements to assure safe use;
- the product may become less competitive;
- we may be subject to fines, injunctions or the imposition of criminal penalties;
- we could be sued and held liable for harm caused to patients; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of the particular product candidate, if approved, and could seriously harm our business.

Drug development is a highly uncertain undertaking and involves a substantial degree of risk. We have no products approved for commercial sale, and we have never generated any revenue from product sales, and we may never generate revenue or be profitable.

We have no products approved for commercial sale and have not generated any revenue from product sales. We do not anticipate generating any revenue from product sales until after we have successfully completed clinical development and received regulatory approval for the commercial sale of a product candidate, which will not occur for several years if ever.

Our ability to generate revenue and achieve profitability depends significantly on many factors, including:

- successfully completing research and preclinical and clinical development of our product candidates;

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- the COVID-19 pandemic, which may result in clinical site closures, delays to patient enrollment, patients discontinuing their treatment or follow up visits or changes to trial protocols;
- obtaining regulatory approvals and marketing authorizations for product candidates for which we successfully complete clinical development and clinical trials;
- developing a sustainable and scalable manufacturing process for our product candidates, as well as establishing and maintaining commercially viable supply relationships with third parties that can provide adequate products and services to support clinical activities and any commercial demand for our product candidates;
- identifying, assessing, acquiring and/or developing new product candidates;
- negotiating favorable terms in any collaboration, licensing or other arrangements into which we may enter;
- the prevalence, duration and severity of potential side effects or other safety issues experienced with our product candidates or future approved products, if any;
- patients' willingness to enroll or continue to participate in a clinical trial during the COVID-19 pandemic;
- launching and successfully commercializing product candidates for which we obtain marketing approval, either by collaborating with a partner or, if launched independently, by establishing a sales, marketing and distribution infrastructure;
- obtaining and maintaining an adequate price for our product candidates, both in the United States and in foreign countries where our products are commercialized;
- obtaining adequate reimbursement for our product candidates or procedures using our product candidates from payors;
- the convenience and durability of our treatment or dosing regimen;
- acceptance by physicians, payors and patients of the benefits, safety and efficacy of our product candidate, or any future product candidates, if approved, including relative to alternative and competing treatments;
- patient demand for any of our product candidates that may be approved;
- addressing any competing technological and market developments;
- maintaining, protecting, expanding and enforcing our portfolio of intellectual property rights, including patents, trade secrets and know-how; and
- attracting, hiring and retaining qualified personnel.

Because of the numerous risks and uncertainties associated with drug development, we are unable to predict the timing or amount of our expenses, or when we will be able to generate any meaningful revenue or achieve or maintain profitability, if ever. In addition, our expenses could increase beyond our current expectations if we are required by the FDA or foreign regulatory agencies, to perform studies in addition to those that we currently anticipate, or if there are any delays in any of our or our collaborators' clinical trials or the development of any of our product candidates. Even if one or more of our product candidates is approved for commercial sale, we anticipate incurring significant costs associated with commercializing any approved product candidate and ongoing compliance efforts.

Even if we are able to generate revenue from the sale of any approved products, we may not become profitable, and we will need to obtain additional funding through one or more equity or debt

financings in order to continue operations. Revenue from the sale of any product candidate for which regulatory approval is obtained will be dependent, in part, upon the size of the markets in the territories for which we gain regulatory approval, the accepted price for the product, the ability to get reimbursement at any price and whether we own the commercial rights for that territory. If the number of addressable patients is not as significant as we anticipate, the indication approved by regulatory authorities is narrower than we expect, the reasonably accepted population for treatment is narrowed by competition, physician choice or treatment guidelines or the price and available third-party reimbursement are lower than anticipated, we may not generate significant revenue from sales of such products, even if approved. Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis.

Our failure to become and remain profitable would decrease the value of our company and could impair our ability to raise capital, expand our business, maintain our research and development efforts, diversify our pipeline of product candidates or continue our operations and cause a decline in the value of our common stock, all or any of which may seriously harm our business.

Public health crises such as pandemics or similar outbreaks have affected and could continue to seriously and adversely affect our preclinical and clinical trials, business, financial condition and results of operations.

In March 2020, the World Health Organization declared COVID-19 a global pandemic, and the United States declared a national emergency with respect to COVID-19. In response to the COVID-19 pandemic, “shelter in place” orders and other public health guidance measures have been implemented across much of the United States and Europe, including in the locations of our offices, clinical trial sites, key vendors and partners. We expect that our clinical development program timelines will be negatively affected by COVID-19, which could harm our business. Further, due to “shelter in place” orders and other public health guidance measures, we have implemented a work-from-home policy for all staff members excluding those necessary to maintain minimum basic operations. Our increased reliance on personnel working from home may negatively impact productivity, or disrupt, delay or otherwise seriously harm our business. For example, with our personnel working from home, some of our research activities that require our personnel to be in our laboratories will be delayed.

As a result of the COVID-19 pandemic, or similar pandemics, and related “shelter in place” orders and other public health guidance measures, we have, and may in the future, experience disruptions that could seriously harm our business. Potential disruptions include but are not limited to:

- delays or difficulties in enrolling patients in our clinical trials;
- delays or difficulties in initiating or expanding clinical trials, including delays or difficulties with clinical site initiation and recruiting clinical site investigators and clinical site staff;
- increased rates of patients withdrawing from our clinical trials following enrollment as a result of contracting COVID-19 or other health conditions or being forced to quarantine;
- interruption of key clinical trial activities, such as clinical trial site data monitoring and efficacy, safety and translational data collection, processing and analyses, due to limitations on travel imposed;
- recommendations by federal, state or local governments, employers and others or interruptions of clinical trial subject visits, which may impact the collection and integrity of subject data and clinical trial endpoints;
- diversion of healthcare resources away from the conduct of clinical trials, including the diversion of hospitals serving as our clinical trial sites and hospital staff supporting the conduct of our clinical trials;

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- delays or disruptions in preclinical experiments and IND-enabling studies due to restrictions of on-site staff and unforeseen circumstances at CROs and vendors;
- interruption or delays in the operations of the FDA and comparable foreign regulatory agencies;
- interruption of, or delays in receiving, supplies of our product candidates from our contract manufacturing organizations due to staffing shortages, raw materials shortages, production slowdowns or stoppages and disruptions in delivery systems;
- delays in receiving approval from local regulatory authorities to initiate our planned clinical trials;
- limitations on employee or other resources that would otherwise be focused on the conduct of our clinical trials and preclinical work, including because of sickness of employees or their families, the desire of employees to avoid travel or contact with large groups of people, an increased reliance on working from home, school closures or mass transit disruptions;
- changes in regulations as part of a response to the COVID-19 pandemic which may require us to change the ways in which our clinical trials are conducted, which may result in unexpected costs, or to discontinue the clinical trials altogether;
- delays in necessary interactions with regulators, ethics committees and other important agencies and contractors due to limitations in employee resources or forced furlough of government or contractor personnel; and
- refusal of the FDA to accept data from clinical trials in affected geographies outside the United States.

These and other factors arising from the COVID-19 pandemic could worsen in countries that are already afflicted with COVID-19, could continue to spread to additional countries or could return to countries where the pandemic has been partially contained, each of which could further adversely impact our ability to conduct clinical trials and our business generally, and could seriously harm our business.

The COVID-19 pandemic continues to rapidly evolve. The extent to which the COVID-19 pandemic may affect our clinical trials, business, financial condition and results of operations will depend on future developments, which are highly uncertain and cannot be predicted at this time, such as the ultimate geographic spread of the disease, the duration of the pandemic, travel restrictions and actions to contain the outbreak or treat its impact, such as social distancing and quarantines or lock-downs in the United States and other countries, business closures or business disruptions and the effectiveness of actions taken in the United States and other countries to contain and treat the disease. Future developments in these and other areas present material uncertainty and risk with respect to our clinical trials, business, financial condition and results of operations.

We may encounter substantial delays in our clinical trials or may not be able to conduct or complete our clinical trials on the timelines we expect, if at all.

Clinical testing is expensive, time consuming, and subject to uncertainty. We cannot guarantee that any clinical trials will be initiated or conducted as planned or completed on schedule, if at all. For example, in the first half of 2019 a manufacturing batch of our product candidate 4D-110 produced at a CMO failed to meet the specifications required for use in our planned clinical trial due to an issue identified with one of the plasmids used in the manufacturing process. As a result, we delayed the initiation of our planned first-in-human trial of 4D-110 until July 2020, so that we could produce the clinical-grade material required for the trial using our in-house manufacturing facility. We also cannot be sure that submission of an IND or a clinical trial application (CTA) will result in the FDA or other

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regulatory authority, as applicable, allowing clinical trials to begin in a timely manner, if at all. Moreover, even if these trials begin, issues may arise that could suspend or terminate such clinical trials. A failure of one or more clinical trials can occur at any stage of testing, and our future clinical trials may not be successful. Events that may prevent successful or timely initiation or completion of clinical trials include:

- inability to generate sufficient preclinical, toxicology, or other *in vivo* or *in vitro* data to support the initiation or continuation of clinical trials;
- delays in reaching a consensus with regulatory agencies on study design or implementation of the clinical trials;
- adverse impacts from the COVID-19 pandemic as further described elsewhere in these risk factors;
- delays or failure in obtaining regulatory authorization to commence a trial;
- delays in reaching agreement on acceptable terms with prospective contract research organizations (CROs) and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and clinical trial sites;
- delays in identifying, recruiting and training suitable clinical investigators;
- delays in obtaining required IRB approval at each clinical trial site;
- delays in manufacturing, testing, releasing, validating, or importing/exporting sufficient stable quantities of our product candidates for use in clinical trials or the inability to do any of the foregoing;
- insufficient or inadequate supply or quality of product candidates or other materials necessary for use in clinical trials, or delays in sufficiently developing, characterizing or controlling a manufacturing process suitable for clinical trials;
- imposition of a temporary or permanent clinical hold by regulatory agencies for a number of reasons, including after review of an IND or amendment, CTA or amendment, or equivalent foreign application or amendment; as a result of a new safety finding that presents unreasonable risk to clinical trial participants; or a negative finding from an inspection of our clinical trial operations or study sites;
- developments on trials conducted by competitors for related technology that raise FDA or foreign regulatory authority concerns about risk to patients of the technology broadly; or if the FDA or a foreign regulatory authority finds that the investigational protocol or plan is clearly deficient to meet its stated objectives;
- delays caused by patients withdrawing from clinical trials or failing to return for post-treatment follow-up;
- difficulty collaborating with patient groups and investigators;
- failure by our CROs, other third parties, or us to adhere to clinical trial protocols;
- failure to perform in accordance with the FDA's or any other regulatory authority's good clinical practice requirements (GCPs) or applicable regulatory guidelines in other countries;
- occurrence of adverse events associated with the product candidate that are viewed to outweigh its potential benefits;
- changes in regulatory requirements and guidance that require amending or submitting new clinical protocols;
- changes in the standard of care on which a clinical development plan was based, which may require new or additional trials;

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- the cost of clinical trials of our product candidates being greater than we anticipate;
- clinical trials of our product candidates producing negative or inconclusive results, which may result in our deciding, or regulators requiring us, to conduct additional clinical trials or abandon development of such product candidates;
- transfer of manufacturing processes to larger-scale facilities operated by a contract manufacturing organization (CMO) or by us, and delays or failure by our CMOs or us to make any necessary changes to such manufacturing process; and
- third parties being unwilling or unable to satisfy their contractual obligations to us.

In addition, disruptions caused by the COVID-19 pandemic may increase the likelihood that we encounter such difficulties or delays in initiating, enrolling, conducting or completing our planned and ongoing clinical trials

Patient enrollment, a significant factor in the timing of clinical trials, is affected by many factors including the severity and difficulty of diagnosing the disease under investigation, size of the patient population and process for identifying subjects, eligibility and exclusion criteria for the trial in question, design of the trial protocol, availability and efficacy of approved therapies or other clinical trials for the disease or condition under investigation, perceived risks and benefits of the product candidate under trial or testing, availability of genetic testing for potential patients, efforts to facilitate timely enrollment in clinical trials, patient referral practices of physicians, ability to obtain and maintain subject consent, the risk that enrolled subjects will drop out before completion of the trial, the ability to monitor patients adequately during and after treatment, and the proximity and availability of clinical trial sites for prospective patients. Furthermore, we rely on CROs and clinical trial sites to ensure the proper and timely conduct of our clinical trials, and while we have agreements governing their committed activities, we have limited influence over their actual performance.

Any inability to successfully initiate or complete clinical trials could result in additional costs to us or impair our ability to generate revenue. In addition, if we make manufacturing or formulation changes to our product candidates, we may be required to, or we may elect to conduct additional studies to bridge our modified product candidates to earlier versions. Clinical trial delays could also shorten any periods during which our products have patent protection and may allow our competitors to bring products to market before we do, which could impair our ability to successfully commercialize our product candidates and may seriously harm our business.

We could also encounter delays if a clinical trial is suspended or terminated by us, by the data safety monitoring board for such trial or by the FDA or any other regulatory authority, or if the IRBs of the institutions in which such trials are being conducted suspend or terminate the participation of their clinical investigators and sites subject to their review. Such authorities may suspend or terminate a clinical trial due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a product candidate, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial.

Delays in the completion of any clinical trial of our product candidates will increase our costs, slow down our product candidate development and approval process and delay or potentially jeopardize our ability to commence product sales and generate revenue. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates.

The limited number of patients who have the diseases for which our product candidates are being studied may make it more difficult for us to enroll or complete clinical trials or may result in findings in our clinical trials that do not reach levels of statistical significance sufficient for marketing approval.

Most of the conditions for which we plan to evaluate our current product candidates in clinical trials are rare genetic diseases. Accordingly, there are limited patient pools from which to draw for clinical trials. In addition to the rarity of these diseases, the eligibility criteria of our clinical trials will further limit the pool of available study participants as we will require that patients have specific characteristics that we can measure to assure their disease is either severe enough or not too advanced to include them in a trial. We or our collaborators may not be able to initiate or continue clinical trials on a timely basis or at all for any of our product candidates if we or our collaborators are unable to locate and enroll a sufficient number of eligible patients to participate in the trials as required by applicable regulations or as needed to provide appropriate statistical power for a given trial. Similarly, because most of the conditions we intend to treat are rare in nature, we plan to design and conduct clinical trials utilizing a small number of patients in order to evaluate the safety and therapeutic activity of our product candidates. Conducting trials in smaller subject populations increases the risk that any safety or efficacy issues observed in only a few patients could prevent such trials from reaching statistical significance or otherwise meeting their specified endpoints, which could require us to conduct additional clinical trials, or delay or prevent our product candidates from receiving regulatory approval, which would seriously harm our business.

Research and development of biopharmaceutical products is inherently risky. We cannot give any assurance that any of our product candidates will receive regulatory approval, which is necessary before they can be commercialized or if they will ever be successfully commercialized.

We are at an early stage of development of our product candidates. Our future success is dependent on our ability to successfully develop, obtain regulatory approval for, and then successfully commercialize our product candidates, and we may fail to do so for many reasons, including the following:

- our product candidates may not successfully complete preclinical studies or clinical trials;
- delays in our clinical development plans due to the COVID-19 pandemic;
- a product candidate may on further study be shown to have harmful side effects or other characteristics that indicate it does not meet applicable regulatory criteria;
- our competitors may develop therapeutics that render our product candidates obsolete or less attractive;
- our competitors may develop platform technologies that render our Therapeutic Vector Evolution platform technology obsolete or less attractive;
- the product candidates and Therapeutic Vector Evolution platform technology that we develop may not be sufficiently covered by intellectual property for which we hold exclusive rights or may be covered by third-party patents or other intellectual property or exclusive rights;
- the market for a product candidate may change so that the continued development of that product candidate is no longer reasonable or commercially attractive;
- a product candidate may not be capable of being produced in commercial quantities at an acceptable cost, or at all;
- if a product candidate obtains regulatory approval, we may be unable to establish sales and marketing capabilities, or successfully market such approved product candidate; and

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- a product candidate may not be accepted as safe and effective by patients, the medical community or third-party payors.

If any of these events occur, we or our collaborators may be forced to abandon our development efforts for a product candidate or candidates, which would seriously harm our business. Failure of a product candidate may occur at any stage of preclinical or clinical development, and, because our product candidates and our Therapeutic Vector Evolution platform technology are in an early stage of development, there is a relatively higher risk of failure and we may never succeed in developing marketable products or generating product revenue.

We may not be successful in our efforts to further develop our Therapeutic Vector Evolution platform technology and current product candidates. We are not permitted to market or promote any of our product candidates before we receive regulatory approval from the FDA or comparable foreign regulatory authorities, and we may never receive such regulatory approval for any of our product candidates. Each of our product candidates is in the early stages of development and will require significant additional clinical development, management of preclinical, clinical, and manufacturing activities, regulatory approval, adequate manufacturing supply, a commercial organization, and significant marketing efforts before we generate any revenue from product sales, if at all. Any clinical trials that we may conduct may not demonstrate the efficacy and safety necessary to obtain regulatory approval to market our product candidates. If the results of our ongoing or future clinical trials are inconclusive with respect to the efficacy of our product candidates or if we do not meet the clinical endpoints with statistical significance or if there are safety concerns or adverse events associated with our product candidates, we may be prevented or delayed in obtaining marketing approval for our product candidates.

If any of our product candidates successfully completes clinical trials, we generally plan to seek regulatory approval to market our product candidates in the United States, the European Union, and in additional foreign countries where we believe there is a viable commercial opportunity. We have never commenced, compiled or submitted an application seeking regulatory approval to market any product candidate. We may never receive regulatory approval to market any product candidates even if such product candidates successfully complete clinical trials, which would seriously harm our business. To obtain regulatory approval in countries outside the United States, we must comply with numerous and varying regulatory requirements of such other countries regarding safety, efficacy, purity, potency, chemistry, manufacturing and controls, clinical trials, commercial sales, pricing and distribution of our product candidates. We may also rely on our collaborators or collaboration partners to conduct the required activities to support an application for regulatory approval, and to seek approval, for one or more of our product candidates. We cannot be sure that our collaborators or collaboration partners will conduct these activities successfully or do so within the timeframe we desire. Even if we (or our collaborators or collaboration partners) are successful in obtaining approval in one jurisdiction, we cannot ensure that we will obtain approval in any other jurisdictions. Failure to obtain approval for our product candidates in multiple jurisdictions, will seriously harm our business.

Even if we receive regulatory approval to market any of our product candidates, we cannot assure you that any such product candidate will be successfully commercialized, widely accepted in the marketplace or more effective than other commercially available alternatives. Any approval we may obtain could be for indications or patient populations that are not as broad as intended or desired or may require labeling that includes significant use or distribution restrictions or safety warnings. We may also be required to perform additional or unanticipated clinical trials to obtain approval or be subject to additional post-marketing testing requirements to maintain approval. In addition, regulatory authorities may withdraw their approval of a product or impose restrictions on its distribution, such as in the form of a REMS. The failure to obtain timely regulatory approval of product candidates, any product marketing limitations or a product withdrawal would seriously harm our business.

Investment in biopharmaceutical product development involves significant risk that any product candidate will fail to demonstrate adequate efficacy or an acceptable safety profile, gain regulatory approval, and become commercially viable. We cannot provide any assurance that we will be able to successfully advance any of our product candidates through the development process or, if approved, successfully commercialize any of our product candidates.

Disruptions at the FDA and other government agencies caused by funding shortages or global health concerns could hinder their ability to hire, retain or deploy key leadership and other personnel, or otherwise prevent new or modified products from being developed, approved or commercialized in a timely manner or at all, which could seriously harm our business.

The ability of the FDA to review and/or approve new products can be affected by a variety of factors, including government budget and funding levels, statutory, regulatory, and policy changes, the FDA's ability to hire and retain key personnel and accept the payment of user fees, and other events that may otherwise affect the FDA's ability to perform routine functions. Average review times at the FDA have fluctuated in recent years as a result. In addition, government funding of other government agencies that fund research and development activities is subject to the political process, which is inherently fluid and unpredictable. Disruptions at the FDA and other agencies may also slow the time necessary for new drugs and biologics to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, including for 35 days beginning on December 22, 2018, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA, have had to furlough critical FDA employees and stop critical activities.

Separately, in response to the COVID-19 pandemic, on March 10, 2020, the FDA announced its intention to postpone most foreign inspections of manufacturing facilities, and subsequently, on March 18, 2020, the FDA temporarily postponed routine surveillance inspections of domestic manufacturing facilities. Subsequently, on July 10, 2020, the FDA announced its intention to resume certain on-site inspections of domestic manufacturing facilities subject to a risk-based prioritization system. The FDA intends to use this risk-based assessment system to identify the categories of regulatory activity that can occur within a given geographic area, ranging from mission critical inspections to resumption of all regulatory activities. Regulatory authorities outside the United States may adopt similar restrictions or other policy measures in response to the COVID-19 pandemic. If a prolonged government shutdown occurs, or if global health concerns continue to prevent the FDA or other regulatory authorities from conducting their regular inspections, reviews, or other regulatory activities, it could significantly impact the ability of the FDA or other regulatory authorities to timely review and process our regulatory submissions, which could seriously harm our business.

Our clinical trials may fail to demonstrate substantial evidence of the safety and efficacy of our product candidates, which would prevent, delay or limit the scope of regulatory approval and commercialization.

Before obtaining regulatory approvals for the commercial sale of any of our product candidates, we or our collaborators must demonstrate through lengthy, complex and expensive preclinical studies and clinical trials that our product candidates are both safe and effective for use in each target indication. Further, because our product candidates are subject to regulation as biological drug products, we will need to demonstrate that they are safe, pure, and potent for use in their target indications. Each product candidate must demonstrate an adequate risk versus benefit profile in its intended patient population and for its intended use.

Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. The results of preclinical

studies of our product candidates may not be predictive of the results of early-stage or later-stage clinical trials, and results of early clinical trials of our product candidates may not be predictive of the results of later-stage clinical trials. The results of clinical trials in one set of patients or disease indications may not be predictive of those obtained in another. In some instances, there can be significant variability in safety or efficacy results between different clinical trials of the same product candidate due to numerous factors, including changes in trial procedures set forth in protocols, differences in the size and type of the patient populations, changes in and adherence to the dosing regimen and other clinical trial protocols and the rate of dropout among clinical trial participants. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy profile despite having progressed through preclinical studies and initial clinical trials. A number of companies in the biopharmaceutical industry have suffered significant setbacks in advanced clinical trials due to lack of efficacy or unacceptable safety issues, notwithstanding promising results in earlier trials. Most product candidates that begin clinical trials are never approved by regulatory authorities for commercialization.

We have limited experience in designing clinical trials and may be unable to design and execute a clinical trial to support marketing approval. We cannot be certain that our planned clinical trials or any other future clinical trials will be successful. Additionally, any safety concerns observed in any one of our clinical trials in our targeted indications could limit the prospects for regulatory approval of our product candidates in those and other indications, which could seriously harm our business.

In addition, even if such clinical trials are successfully completed, we cannot guarantee that the FDA or foreign regulatory authorities will interpret the results as we do, and more trials could be required before we submit our product candidates for approval. To the extent that the results of the trials are not satisfactory to the FDA or foreign regulatory authorities for support of a marketing application, we may be required to expend significant resources, which may not be available to us, to conduct additional trials in support of potential approval of our product candidates. Even if regulatory approval is secured for any of our product candidates, the terms of such approval may limit the scope and use of our product candidate, which may also limit its commercial potential.

Interim “top-line” and preliminary data from studies or trials that we announce or publish from time to time may change as more data become available and are subject to audit and verification procedures that could result in material changes in the final data.

From time to time, we may publish interim “top-line” or preliminary data from preclinical studies or clinical trials. Interim data are subject to the risk that one or more of the outcomes may materially change as more data become available. We also make assumptions, estimations, calculations and conclusions as part of our analyses of data, and we may not have received or had the opportunity to fully and carefully evaluate all data. As a result, the top-line results that we report may differ from future results of the same studies, or different conclusions or considerations may qualify such results, once additional data have been received and fully evaluated. Preliminary or “top-line” data also remain subject to audit and verification procedures that may result in the final data being materially different from the preliminary data we previously published. As a result, interim and preliminary data should be viewed with caution until the final data are available. Additionally, interim data from clinical trials that we may complete are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and more patient data become available. Adverse differences between preliminary or interim data and final data could seriously harm our business.

Further, others, including regulatory agencies, may not accept or agree with our assumptions, estimates, calculations, conclusions or analyses or may interpret or weigh the importance of data differently, which could impact the value of the particular program, the approvability or commercialization of the particular product candidate or product and our company in general. In

addition, the information we choose to publicly disclose regarding a particular study or clinical trial is based on what is typically extensive information, and you or others may not agree with what we determine is the material or otherwise appropriate information to include in our disclosure. Any information we determine not to disclose may ultimately be deemed significant by you or others with respect to future decisions, conclusions, views, activities or otherwise regarding a particular product candidate or our business. If the top-line data that we report differ from final results, or if others, including regulatory authorities, disagree with the conclusions reached, our ability to obtain approval for, and commercialize, product candidates may be harmed, which could seriously harm our business.

We may not be successful in our efforts to continue to create a pipeline of product candidates or to develop commercially successful products. If we fail to successfully identify and develop additional product candidates, our commercial opportunity may be limited.

One of our strategies is to identify and pursue preclinical and clinical development and commercialization of additional product candidates through our Therapeutic Vector Evolution platform technology. Our Therapeutic Vector Evolution platform technology may not produce a pipeline of viable product candidates, or our competitors may develop platform technologies that render our Therapeutic Vector Evolution platform technology obsolete or less attractive. Our research methodology may be unsuccessful in identifying potential product candidates or our potential product candidates may be shown to have harmful side effects or may have other characteristics that may make them unmarketable or unlikely to receive marketing approval. Identifying, developing and obtaining regulatory approval and commercializing additional product candidates will require substantial additional funding beyond the net proceeds of this offering and is prone to the risks of failure inherent in drug development. If we are unable to successfully identify, acquire, develop and commercialize additional product candidates, our commercial opportunity may be limited.

We face substantial competition, which may result in others discovering, developing or commercializing products before or more successfully than we do.

The development and commercialization of new drug products is highly competitive. We may face competition with respect to any product candidates that we seek to develop or commercialize in the future from major pharmaceutical companies and biotechnology companies worldwide. Potential competitors also include academic institutions, government agencies, and other public and private research organizations that conduct research, seek patent protection, and establish collaborative arrangements for research, development, manufacturing, and commercialization.

There are a number of large pharmaceutical and biotechnology companies that are currently pursuing the development of products for the treatment of the indications for which we have product candidates, including XLRP, choroideremia, Fabry disease, wet AMD, and cystic fibrosis lung disease. Certain of our competitors have commercially approved products for the treatment of the diseases that we are pursuing or may pursue in the future, including Biogen, Roche, Sanofi, Takeda and Vertex. These drugs are well established therapies and are widely accepted by physicians, patients and third-party payors, which may make it difficult to convince these parties to switch to our product candidates. Companies that we are aware are developing therapeutics in the ophthalmology, cardiology and pulmonology disease areas include large companies with significant financial resources, such as Allergan, Biogen, Novartis, Pfizer, Regeneron, Roche, Sanofi, Takeda and Vertex, and biopharmaceutical companies such as Abeona, Adverum, AGTC, Amicus, AvroBio, Freeline, Kodiak Sciences, Krystal, MeiraGTx, RegenxBio, Sangamo, and Spirovent. In addition to competition from other companies targeting ophthalmology, cardiology and pulmonology, any products we may develop may also face competition from other types of therapies, such as gene-editing therapies and drug delivery devices.

Many of our current or potential competitors, either alone or with their strategic partners, have significantly greater financial resources and expertise in research and development, manufacturing,

preclinical testing, conducting clinical trials, obtaining regulatory approvals, and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our product candidates. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient, or are less expensive than any products that we may develop. Furthermore, currently approved products could be discovered to have application for treatment of ophthalmology, cardiology and pulmonology indications, which could give such products significant regulatory and market timing advantages over any of our product candidates. Our competitors also may obtain FDA, EMA or other regulatory approval for their products more rapidly than we may obtain approval for ours. Additionally, products or technologies developed by our competitors may render our potential product candidates uneconomical or obsolete, and we may not be successful in marketing any product candidates we may develop against competitors.

If, in the future, we are unable to establish sales and marketing capabilities or enter into agreements with third parties to sell and market any product candidates we may develop, we may not be successful in commercializing those product candidates if and when they are approved.

We do not have a sales or marketing infrastructure and have no experience in the sale, marketing or distribution of pharmaceutical products. To achieve commercial success for any approved product for which we retain sales and marketing responsibilities, we must either develop a sales and marketing organization or outsource these functions to third parties. In the future, we may choose to build a focused sales, marketing and commercial support infrastructure to sell, or participate in sales activities with our collaborators for, some of our product candidates if and when they are approved.

There are risks involved with both establishing our own commercial capabilities and entering into arrangements with third parties to perform these services. For example, recruiting and training a sales force or reimbursement specialists is expensive and time consuming and could delay any product launch. If the commercial launch of a product candidate for which we recruit a sales force and establish marketing and other commercialization capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses. This may be costly, and our investment would be lost if we cannot retain or reposition our commercialization personnel.

Factors that may inhibit our efforts to commercialize any approved product on our own include:

- our inability to recruit and retain adequate numbers of effective sales, marketing, reimbursement, compliance, customer service, medical affairs and other support personnel;
- our inability to recruit and build a commercial infrastructure due to the impacts of COVID-19;
- the inability of sales personnel to obtain access to physicians or persuade adequate numbers of physicians to prescribe any future approved products;
- the inability of reimbursement professionals to negotiate arrangements for formulary access, reimbursement, and other acceptance by payors;
- the inability to price our products at a sufficient price point to ensure an adequate and attractive level of profitability;

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- restricted or closed distribution channels that make it difficult to distribute our products to segments of the patient population;
- the lack of complementary products to be offered by sales personnel, which may put us at a competitive disadvantage relative to companies with more extensive product lines; and
- unforeseen costs and expenses associated with creating an independent commercialization organization.

If we enter into arrangements with third parties to perform sales, marketing, commercial support and distribution services, our product revenue or the profitability of product revenue may be lower than if we were to market and sell any products we may develop ourselves. In addition, we may not be successful in entering into arrangements with third parties to commercialize our product candidates or may be unable to do so on terms that are favorable to us. We may have little control over such third parties, and any of them may fail to devote the necessary resources and attention to sell and market our products effectively. If we do not establish commercialization capabilities successfully, either on our own or in collaboration with third parties, we will not be successful in commercializing our product candidates if approved and our business would be seriously harmed.

Even if any product candidates we develop receive marketing approval, they may fail to achieve the degree of market acceptance by physicians, patients, healthcare payors and others in the medical community necessary for commercial success.

The commercial success of any of our product candidates will depend upon its degree of market acceptance by physicians, patients, third-party payors and others in the medical community. Even if any product candidates we may develop receive marketing approval, they may nonetheless fail to gain sufficient market acceptance by physicians, patients, healthcare payors and others in the medical community. The degree of market acceptance of any product candidates we may develop, if approved for commercial sale, will depend on a number of factors, including:

- the efficacy and safety of such product candidates as demonstrated in pivotal clinical trials and published in peer-reviewed journals;
- the potential and perceived advantages compared to alternative treatments;
- the ability to offer our products for sale at competitive prices;
- the ability to offer appropriate patient access programs, such as co-pay assistance;
- sufficient third-party coverage or reimbursement;
- the extent to which physicians recommend our products to their patients;
- convenience and ease of dosing and administration compared to alternative treatments;
- the clinical indications for which the product candidate is approved by FDA, EMA or other regulatory agencies;
- product labeling or product insert requirements of the FDA, EMA or other comparable foreign regulatory authorities, including any limitations, contraindications or warnings contained in a product's approved labeling;
- restrictions on how the product is distributed;
- the timing of market introduction of competitive products;
- publicity concerning our products or competing products and treatments;
- the strength of marketing and distribution support; and
- the prevalence and severity of any side effects.

If any product candidates we develop do not achieve an adequate level of acceptance, we may not generate significant product revenue, and we may not become profitable.

Risks Related to Manufacturing

Gene therapies are novel, complex and difficult to manufacture. We could experience production problems that result in delays in our development or commercialization programs, limit the supply of our products or otherwise seriously harm our business.

We currently have a development, manufacturing and testing agreement and cooperation agreement with Catalent to manufacture supplies of our product candidates in the future. Our product candidates require processing steps that are more complex than those required for most chemical and protein pharmaceuticals. Moreover, unlike chemical pharmaceuticals, the physical and chemical properties of a biologic such as ours generally cannot be fully characterized. As a result, assays of the finished product may not be sufficient to ensure that the product will perform in the intended manner. Accordingly, we employ multiple steps to control our manufacturing process to assure that the process works and the product candidate is made strictly and consistently in compliance with the process. Problems with the manufacturing process, even minor deviations from the normal process, could result in product defects or manufacturing failures that result in lot failures, product recalls, product liability claims or insufficient inventory, which could delay or prevent the initiation of clinical trials or receipt of regulatory approvals. We may encounter problems achieving adequate quantities and quality of clinical-grade materials that meet FDA, or other comparable applicable foreign standards or specifications with consistent and acceptable production yields and costs. For example, in the first half of 2019, a manufacturing batch of our product candidate 4D-110 produced at a CMO failed to meet the specifications required for use in our planned clinical trial due to an issue identified with one of the plasmids used in the manufacturing process. As a result, we delayed the initiation of our planned first-in-human trial of 4D-110 until July 2020, so that we could produce the clinical-grade material required for the trial using our in-house manufacturing facility.

In addition, FDA and other comparable foreign regulatory authorities may require us to submit samples of any lot of any approved product together with the protocols showing the results of applicable tests at any time. Under some circumstances, the FDA or other comparable foreign regulatory authorities may require that we not distribute a lot until the agency authorizes its release. Slight deviations in the manufacturing process, including those affecting quality attributes and stability, may result in unacceptable changes in the product that could result in lot failures or product recalls. Lot failures or product recalls could cause us to delay clinical trials or product launches which could be costly to us and otherwise seriously harm our business.

We also may encounter problems hiring and retaining the experienced scientific, quality control and manufacturing personnel needed to operate our manufacturing process which could result in delays in our production or difficulties in maintaining compliance with applicable regulatory requirements.

Any problems in our manufacturing process or the facilities with which we contract could make us a less attractive collaborator for potential partners, including larger pharmaceutical companies, which could limit our access to additional attractive development programs. Problems in third-party manufacturing process or facilities also could restrict our ability to meet market demand for our products. Additionally, should our agreement with Catalent or agreements with other parties with whom we have manufacturing agreements be terminated for any reason, there are a limited number of manufacturers who would be suitable replacements, and it would take a significant amount of time to transition the manufacturing to a replacement.

Delays in obtaining regulatory approval of our manufacturing process or disruptions in our manufacturing process may delay or disrupt our commercialization efforts.

Before we can begin to commercially manufacture our product candidates in third-party or our own facilities, we must obtain regulatory approval from the FDA to market our product using the manufacturing process and facility we proposed in our marketing application. In addition, we must pass a pre-approval inspection of our manufacturing facility by the FDA before any of our product candidates can obtain marketing approval, if ever. In order to obtain approval of a BLA for our product candidates, we will need to ensure that all of our manufacturing processes, methods and equipment are compliant with cGMP, and perform extensive audits of vendors, contract laboratories and suppliers. If any of our vendors, contract laboratories or suppliers is found to be out of compliance with cGMP, we may experience delays or disruptions in manufacturing while we work with these third parties to remedy the violation or while we work to identify suitable replacement vendors. The cGMP requirements govern quality control of the manufacturing process and documentation policies and procedures. In complying with cGMP, we will be obligated to expend time, money and effort in production, record keeping and quality control to assure that the product meets applicable specifications and other requirements. If we fail to comply with these requirements, we would be subject to possible regulatory action and may not be permitted to sell any products that we may develop.

Delays in developing our manufacturing capabilities or failure to achieve operating efficiencies from it may require us to devote additional resources and management time to manufacturing operations and may delay our product development timelines.

We have a small operational manufacturing facility that we are using to manufacture clinical trial material. In addition, we have leased approximately 17,000 square feet of space primarily for our second manufacturing facility in Emeryville, California, most of which we plan to devote to manufacturing activities for our clinical trials. We may face delays in the production of clinical supply at our manufacturing facility and cannot guarantee when our facility will be able to produce sufficient quantities of product candidates needed to support our planned clinical trials. Any delays in developing our internal manufacturing capabilities may disrupt or delay the supply of our product candidates if we have not maintained a sufficient back-up supply of such product candidates through third-party manufacturers. Moreover, changing manufacturing facilities during the clinical development process may also require that we or our collaborators conduct additional studies, make notifications to regulatory authorities, make additional filings to regulatory authorities, and obtain regulatory authority approval for the new facilities, which may be delayed or which we may never receive. We will further need to comply with the FDA's and applicable foreign regulatory authorities' cGMP requirements for the production of product candidates for clinical trials and, if approved, commercial supply, and will be subject to FDA and comparable foreign regulatory authority inspection. These requirements include the qualification and validation of our manufacturing equipment and processes. We may not be able to develop or acquire the internal expertise and resources necessary for compliance with these requirements.

In order to develop internal manufacturing expertise, we may be forced to devote greater resources and management time than anticipated, particularly in areas relating to operations, quality, regulatory, facilities and information technology. We also may encounter problems hiring and retaining the experienced scientific, quality control and manufacturing personnel needed to operate our manufacturing processes. If we experience unanticipated employee shortage or turnover in any of these areas, we may not be able to effectively manage our ongoing manufacturing operations and we may not achieve the operating efficiencies that we anticipate from developing these capabilities, which may negatively affect our product development timeline or result in difficulties in maintaining compliance with applicable regulatory requirements. Any such problems could result in the delay, prevention or impairment of clinical development and commercialization of our product candidates and would seriously harm our business.

We currently rely and expect to continue to rely on third parties to conduct product manufacturing for certain of our product candidates, and these third parties may not perform satisfactorily.

Although we are in process of expanding internal manufacturing capabilities, we currently rely, and expect to continue to rely, on third parties for the production of some of our preclinical study and planned clinical trial materials and, therefore, we can control only certain aspects of their activities. The facilities used by us and our contract manufacturers to manufacture certain of our product candidates must be reviewed by the FDA pursuant to inspections that will be conducted after we submit our BLA to the FDA. We do not control the manufacturing process of, and are completely dependent on, our contract manufacturing partners for compliance with the cGMPs for manufacture of our products. If we or our contract manufacturers cannot successfully manufacture material that conforms to our specifications and the strict regulatory requirements of the FDA or others, we will not be able to obtain and/or maintain regulatory approval for our products as manufactured at their manufacturing facilities. In addition, we have no control over the ability of our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel. If the FDA or a comparable foreign regulatory authority does not approve these facilities for the manufacture of our product candidates or if it withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for or market our product candidates, if approved.

In addition, we rely on additional third parties to manufacture plasmids used in the manufacture of our product candidates and to perform quality testing, and reliance on these third parties entails risks to which we would not be subject if we manufactured the product candidates ourselves, including:

- reduced control for certain aspects of manufacturing activities;
- termination or nonrenewal of manufacturing and service agreements with third parties in a manner or at a time that is costly or damaging to us; and
- disruptions to the operations of our third-party manufacturers and service providers caused by conditions unrelated to our business or operations, including the bankruptcy of the manufacturer or service provider.

Any of these events could lead to clinical trial delays or failure to obtain regulatory approval, or impact our ability to successfully commercialize future product candidates. Some of these events could be the basis for FDA or European Union Member State regulatory authority action, including injunction, recall, seizure or total or partial suspension of product manufacture.

Any contamination in our manufacturing process, shortages of raw materials or failure of any of our key suppliers to deliver necessary components could result in delays in our research studies, preclinical, clinical development or marketing schedules.

Given the nature of biologics manufacturing, there is a risk of contamination during manufacturing. Any contamination could materially harm our ability to produce product candidates on schedule and could harm our results of operations and cause reputational damage.

Some of the raw materials required in our manufacturing process, such as plasmids, are derived from biologic sources. Such raw materials are difficult to procure and may be subject to contamination or recall. A material shortage, contamination, recall or restriction on the use of biologically derived substances in the manufacture of our product candidates could adversely impact or disrupt the commercial manufacturing or the production of clinical material, which could seriously harm our business.

We depend on third-party suppliers for key raw materials used in our manufacturing processes, and the loss of these third-party suppliers or their inability to supply us with adequate raw materials could seriously harm our business.

We rely on third-party suppliers for the raw materials required for the production of our product candidates. Our dependence on these third-party suppliers and the challenges we may face in obtaining adequate supplies of raw materials involve several risks, including limited control over pricing, availability, quality and delivery schedules. As a small company, our negotiation leverage is limited and we are likely to get lower priority than our competitors who are larger than we are. We cannot be certain that our suppliers will continue to provide us with the quantities of these raw materials that we require or satisfy our anticipated specifications and quality requirements. Any interruption in supply of raw materials could materially harm our ability to manufacture our product candidates until a new source of supply, if any, could be identified and qualified. We may be unable to find a sufficient alternative supplier in a reasonable time or on commercially reasonable terms. Any performance failure on the part of our suppliers could delay the development and potential commercialization of our product candidates, including limiting supplies necessary for clinical trials and regulatory approvals, which would seriously harm our business.

Risks Related to Regulatory Approval and Other Legal Compliance Matters

The regulatory approval processes of the FDA, EMA and comparable foreign regulatory authorities are lengthy, expensive, time consuming, and inherently unpredictable. If we are ultimately unable to obtain regulatory approval for our product candidates, we will be unable to generate product revenue and our business will be seriously harmed.

We and any collaborators are not permitted to commercialize, market, promote or sell any product candidate in the United States without obtaining marketing approval from the FDA. Foreign regulatory authorities impose similar requirements. The time required to obtain approval by the FDA and comparable foreign regulatory authorities is unpredictable, typically takes many years following the commencement of clinical trials and depends upon numerous factors, including the type, complexity and novelty of the product candidates involved. In addition, approval policies, regulations or the type and amount of clinical data necessary to gain approval may change during the course of a product candidate's clinical development and may vary among jurisdictions, which may cause delays in the approval or the decision not to approve an application. Regulatory authorities have substantial discretion in the approval process and may refuse to accept any application or may decide that our data are insufficient for approval and require additional preclinical, clinical or other studies. We have not submitted for or obtained regulatory approval for any product candidate. We and any collaborators must complete additional preclinical or nonclinical studies and clinical trials to demonstrate the safety and efficacy of our product candidates in humans to the satisfaction of the regulatory authorities before we will be able to obtain these approvals, and it is possible that none of our existing product candidates or any product candidates we may seek to develop in the future will ever obtain regulatory approval.

Applications for our product candidates could fail to receive regulatory approval for many reasons, including but not limited to the following:

- the FDA or comparable foreign regulatory authorities may disagree with the design, implementation or results of our or our collaborators' clinical trials;
- the FDA or comparable foreign regulatory authorities may determine that our product candidates are not safe and effective, only moderately effective or have undesirable or unintended side effects, toxicities or other characteristics that preclude our obtaining marketing approval or prevent or limit commercial use of our products;
- the population studied in the clinical program may not be sufficiently broad or representative to assure efficacy and safety in the full population for which we seek approval;

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- we or our collaborators may be unable to demonstrate to the FDA, or comparable foreign regulatory authorities that a product candidate's clinical and other benefits outweigh its safety risks;
- the FDA or comparable foreign regulatory authorities may disagree with our or our collaborators' interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials of our product candidates may not be sufficient to support the submission of a BLA or other submission or to obtain regulatory approval in the United States or elsewhere;
- the FDA or comparable foreign regulatory authorities may fail to approve the manufacturing processes, test procedures and specifications, or facilities of third-party manufacturers with which we contract for clinical and commercial supplies; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our or our collaborators' clinical data insufficient for approval.

This lengthy approval process, as well as the unpredictability of the results of clinical trials, may result in our failing to obtain regulatory approval to market any of our product candidates, which would seriously harm our business.

In addition, even if we or our collaborators were to obtain approval, regulatory authorities may approve any of our product candidates for fewer or more limited indications than we request, may impose significant limitations in the form of narrow indications, warnings, or a REMS. Regulatory authorities may not approve the price we or our collaborators intend to charge for products we may develop, may grant approval contingent on the performance of costly post-marketing clinical trials, or may approve a product candidate with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that product candidate. Any of the foregoing scenarios could seriously harm our business.

We may attempt to secure approval from the FDA or comparable foreign regulatory authorities through the use of accelerated approval pathways. If we are unable to obtain such approval, we may be required to conduct additional clinical trials beyond those that we contemplate, which could increase the expense of obtaining, and delay the receipt of, necessary marketing approvals. Even if we receive accelerated approval from the FDA, if our confirmatory trials do not verify clinical benefit, or if we do not comply with rigorous post-marketing requirements, the FDA may seek to withdraw accelerated approval.

We may in the future seek an accelerated approval for one or more of our product candidates. Under the accelerated approval program, the FDA may grant accelerated approval to a product candidate designed to treat a serious or life-threatening condition that provides meaningful therapeutic benefit over available therapies upon a determination that the product candidate has an effect on a surrogate endpoint or intermediate clinical endpoint that is reasonably likely to predict clinical benefit. The FDA considers a clinical benefit to be a positive therapeutic effect that is clinically meaningful in the context of a given disease, such as irreversible morbidity or mortality. For the purposes of accelerated approval, a surrogate endpoint is a marker, such as a laboratory measurement, radiographic image, physical sign, or other measure that is thought to predict clinical benefit, but is not itself a measure of clinical benefit. An intermediate clinical endpoint is a clinical endpoint that can be measured earlier than an effect on irreversible morbidity or mortality that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit. The accelerated approval pathway may be used in cases in which the advantage of a new drug over available therapy may not be a direct therapeutic advantage, but is a clinically important improvement from a patient and public

health perspective. If granted, accelerated approval is usually contingent on the sponsor's agreement to conduct, in a diligent manner, additional post-approval confirmatory studies to verify and describe the drug's clinical benefit. If such post-approval studies fail to confirm the drug's clinical benefit, the FDA may withdraw its approval of the drug.

Prior to seeking accelerated approval for any of our product candidates, we intend to seek feedback from the FDA and will otherwise evaluate our ability to seek and receive accelerated approval. There can be no assurance that after our evaluation of the feedback and other factors we will decide to pursue or submit a BLA for accelerated approval or any other form of expedited development, review or approval. Similarly, there can be no assurance that after subsequent FDA feedback we will continue to pursue or apply for accelerated approval or any other form of expedited development, review or approval, even if we initially decide to do so. Furthermore, if we decide to submit an application for accelerated approval or receive an expedited regulatory designation (e.g., breakthrough therapy designation) for our product candidates, there can be no assurance that such submission or application will be accepted or that any expedited development, review or approval will be granted on a timely basis, or at all. The FDA or other comparable foreign regulatory authorities could also require us to conduct further studies prior to considering our application or granting approval of any type. A failure to obtain accelerated approval or any other form of expedited development, review or approval for our product candidate would result in a longer time period to commercialization of such product candidate, if any, could increase the cost of development of such product candidate and could harm our competitive position in the marketplace.

Even if we or our collaborators obtain regulatory approval for a product candidate, our products will remain subject to regulatory scrutiny.

If one of our product candidates is approved, it will be subject to ongoing regulatory requirements for manufacturing, labeling, packaging, storage, advertising, promotion, sampling, record-keeping, conduct of post-marketing studies, and submission of safety, efficacy, and other post-market information, including both federal and state requirements in the United States and requirements of comparable foreign regulatory authorities.

Manufacturers and manufacturers' facilities are required to comply with extensive FDA and comparable foreign regulatory authority requirements, including ensuring that quality control and manufacturing procedures conform to cGMP regulations. As such, we and our contract manufacturers will be subject to continual review and inspections to assess compliance with cGMP and adherence to commitments made in any approved marketing application. Accordingly, we and others with whom we work must continue to expend time, money and effort in all areas of regulatory compliance, including manufacturing, production, and quality control.

We will have to comply with requirements concerning advertising and promotion for our products. Promotional communications with respect to prescription drugs and biologics are subject to a variety of legal and regulatory restrictions and must be consistent with the information in the product's approved label. As such, we may not promote our products "off-label" for indications or uses for which they do not have approval, though we may share truthful and not misleading information that is otherwise consistent with our product's FDA approved labeling. The holder of an approved application must submit new or supplemental applications and obtain approval for certain changes to the approved product, product labeling, or manufacturing process. We could also be asked to conduct post-marketing clinical studies to verify the safety and efficacy of our products in general or in specific patient subsets. An unsuccessful post-marketing study or failure to complete such a study could result in the withdrawal of marketing approval or label restrictions.

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If a regulatory agency discovers previously unknown problems with a product, such as adverse events of unanticipated severity or frequency, or problems with the facility where the product is manufactured, or disagrees with the promotion, marketing or labeling of a product, such regulatory agency may impose restrictions on that product or us, including requiring withdrawal of the product from the market. If we fail to comply with applicable regulatory requirements, a regulatory agency or enforcement authority may, among other things:

- issue warning letters;
- impose civil or criminal penalties;
- suspend or withdraw regulatory approval;
- suspend any of our clinical trials;
- refuse to approve pending applications or supplements to approved applications submitted by us;
- impose restrictions on our operations, including closing our contract manufacturers' facilities; or
- seize or detain products, or require a product recall.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response, and could generate negative publicity. Any failure to comply with ongoing regulatory requirements may adversely affect our ability to commercialize and generate revenue from our products. If regulatory sanctions are applied or if regulatory approval is withdrawn, our business will be seriously harmed.

Moreover, the policies of the FDA and of other regulatory authorities may change and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of our product candidates. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may lose any marketing approval that we may have obtained and we may not achieve or sustain profitability.

We have received Fast Track designation for 4D-310 for the treatment of Fabry disease to improve pain, disability and organ dysfunction, and we may seek Fast Track designation for certain future product candidates, but we may not be able to obtain such designations, and there is no guarantee that 4D-310 will experience a faster regulatory review or obtain regulatory approval.

If a product is intended for the treatment of a serious or life-threatening condition and preclinical or clinical data demonstrate the potential to address an unmet medical need for this disease condition, the product sponsor may apply for Fast Track designation. The sponsor of a Fast Track product has opportunities for more frequent interactions with the applicable FDA review team during product development and, once a BLA is submitted, the product candidate may be eligible for priority review. A fast track product may also be eligible for rolling review, where the FDA may consider for review sections of the BLA on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the BLA, the FDA agrees to accept sections of the BLA and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the BLA. The FDA has broad discretion whether or not to grant this designation, so even if we believe a particular product candidate is eligible for this designation, we cannot assure you that the FDA would decide to grant it. We have received Fast Track designation for 4D-310 for the treatment of Fabry disease to improve pain, disability and organ

dysfunction, and we may receive Fast Track designation for other product candidates in the future; however, we may not experience a faster development, review or approval process, and receipt of the designation does not increase the likelihood that the FDA will approve 4D-310 for any indication. In addition, the FDA may rescind the Fast Track designation if it believes that the designation is no longer supported by data from our clinical development program.

We have received orphan drug designation for 4D-110 for the treatment of choroideremia and for 4D-310 for the treatment of Fabry disease, and we may seek orphan drug designation for certain future product candidates, but we may be unable to obtain such designations or to maintain the benefits associated with orphan drug designation, including market exclusivity, which may cause our revenue, if any, to be reduced.

We have received orphan drug designation in the United States for 4D-110 for the treatment of choroideremia and for 4D-310 for the treatment of Fabry disease. Although we may seek orphan product designation for some or all of our other product candidates, we may never receive such designations. Under the Orphan Drug Act, the FDA may designate a drug or biologic product as an orphan drug if it is intended to treat a rare disease or condition, defined as a patient population of fewer than 200,000 in the United States, or a patient population greater than 200,000 in the United States where there is no reasonable expectation that the cost of developing the drug will be recovered from sales in the United States. Orphan drug designation must be requested before submitting a BLA. In the European Union, the EMA's Committee for Orphan Medicinal Products (COMP), grants orphan drug designation to promote the development of products that are intended for the diagnosis, prevention, or treatment of a life-threatening or chronically debilitating condition affecting not more than five in 10,000 persons in the European Union. Additionally, designation is granted for products intended for the diagnosis, prevention, or treatment of a life-threatening, seriously debilitating or serious and chronic condition when, without incentives, it is unlikely that sales of the drug in the European Union would be sufficient to justify the necessary investment in developing the drug or biological product or where there is no satisfactory method of diagnosis, prevention, or treatment, or, if such a method exists, the medicine must be of significant benefit to those affected by the condition.

In the United States, orphan drug designation entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages, and application fee waivers. After the FDA grants orphan drug designation, the generic identity of the drug and its potential orphan use are disclosed publicly by the FDA.

In addition, if a product receives the first FDA approval for the indication for which it has orphan designation, the product is entitled to orphan drug exclusivity, which means the FDA may not approve any other application to market the same drug for the same indication for a period of seven years, except in limited circumstances, such as a showing of clinical superiority over the product with orphan exclusivity or where the manufacturer is unable to assure sufficient product quantity for the orphan patient population. Exclusive marketing rights in the United States may also be unavailable if we or our collaborators seek approval for an indication broader than the orphan designated indication and may be lost if the FDA later determines that the request for designation was materially defective. In the European Union, orphan drug designation entitles a party to financial incentives such as reduction of fees or fee waivers and ten years of market exclusivity following drug or biological product approval. This period may be reduced to six years if the orphan drug designation criteria are no longer met, including where it is shown that the product is sufficiently profitable not to justify maintenance of market exclusivity.

Even if we obtain orphan drug designation, we may not be the first to obtain marketing approval for any particular orphan indication due to the uncertainties associated with developing pharmaceutical products. Further, even if we obtain orphan drug exclusivity for a product candidate, that exclusivity

may not effectively protect the product from competition because different drugs with different active moieties can be approved for the same condition. Even after an orphan drug is approved, the FDA can subsequently approve the same drug with the same active moiety for the same condition if the FDA concludes that the later drug is clinically superior in that it is safer, more effective, or makes a major contribution to patient care. Orphan drug designation neither shortens the development time or regulatory review time of a drug or biologic nor gives the drug or biologic any advantage in the regulatory review or approval process.

If the product candidates that we or our collaborators may develop receive regulatory approval in the United States or another jurisdiction, they may never receive approval in other jurisdictions, which would limit market opportunities for such product candidate and seriously harm our business.

Approval of a product candidate in the United States by the FDA or by the requisite regulatory agencies in any other jurisdiction does not ensure approval of such product candidate by regulatory authorities in other countries or jurisdictions. The approval process varies among countries and may limit our or our collaborators' ability to develop, manufacture, promote and sell product candidates internationally. Failure to obtain marketing approval in international jurisdictions would prevent the product candidates from being marketed outside of the jurisdictions in which regulatory approvals have been received. In order to market and sell product candidates in the European Union and many other jurisdictions, we and our collaborators must obtain separate marketing approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and may involve additional preclinical studies or clinical trials both before and after approval. In many countries, any product candidate for human use must be approved for reimbursement before it can be approved for sale in that country. In some cases, the intended price for such product is also subject to approval. Further, while regulatory approval of a product candidate in one country does not ensure approval in any other country, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory approval process in others. If we or our collaborators fail to comply with the regulatory requirements in international markets or to obtain all required marketing approvals, the target market for a particular potential product will be reduced, which would limit our ability to realize the full market potential for the product and seriously harm our business.

Enacted and future healthcare legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize our product candidates and may affect the prices we may set.

In the United States, the European Union and other jurisdictions, there have been, and we expect there will continue to be, a number of legislative and regulatory changes and proposed changes to the healthcare system that could affect our future results of operations. In particular, there have been and continue to be a number of initiatives at the U.S. federal and state levels that seek to reduce healthcare costs and improve the quality of healthcare. For example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act (collectively the ACA) was enacted, which substantially changed the way healthcare is financed by both governmental and private payors. Among the provisions of the ACA, those of greatest importance to the pharmaceutical and biotechnology industries include the following:

- an annual, non-deductible fee payable by any entity that manufactures or imports certain branded prescription drugs and biologic agents (other than those designated as orphan drugs), which is apportioned among these entities according to their market share in certain government healthcare programs;

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- new requirements to report certain financial arrangements with physicians and teaching hospitals, including reporting “transfers of value” made or distributed to prescribers and other healthcare providers and reporting investment interests held by physicians and their immediate family members;
- an increase to the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and an extension the rebate program to individuals enrolled in Medicaid managed care organizations;
- a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected;
- expansion of eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to certain individuals with income at or below 133% of the federal poverty level, thereby potentially increasing a manufacturer’s Medicaid rebate liability;
- a licensure framework for follow-on biologic products;
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research; and
- establishment of a Center for Medicare Innovation at the Centers for Medicare & Medicaid Services (CMS) to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending.

Since its enactment, there have been judicial, U.S. Congressional and executive branch challenges to certain aspects of the ACA, and we expect there will be additional challenges and amendments to the ACA in the future. For example, the Tax Cuts and Jobs Act of 2017 was enacted, which includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the “individual mandate”. On December 14, 2018, a U.S. District Court Judge in the Northern District of Texas (Texas District Court Judge) ruled that the individual mandate is a critical and inseparable feature of the ACA, and therefore, because it was repealed as part of the Tax Act, the remaining provisions of the ACA are invalid as well. On March 2, 2020, the U.S. Supreme Court granted the petitions for writs of certiorari to review the case, although it is unclear when a decision will be made or how the Supreme Court will rule. It is also unclear how other efforts to challenge, repeal or replace the ACA will impact the ACA or our business.

In addition, other legislative changes have been proposed and adopted in the United States since the ACA was enacted. In August 2011, the Budget Control Act of 2011, among other things, led to aggregate reductions of Medicare payments to providers of 2% per fiscal year. These reductions went into effect in April 2013 and, due to subsequent legislative amendments to the statute, will remain in effect through 2030, with the exception of a temporary suspension from May 1, 2020 through December 31, 2020, unless additional action is taken by Congress. In January 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several types of providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws or any other similar laws introduced in the future may result in additional reductions in Medicare and other health care funding, which could negatively affect our customers and accordingly, seriously harm our business.

Moreover, payment methodologies may be subject to changes in healthcare legislation and regulatory initiatives. For example, CMS may develop new payment and delivery models, such as bundled payment models. In addition, recently there has been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which has resulted in

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several U.S. Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under government payor programs, and review the relationship between pricing and manufacturer patient programs. On March 10, 2020, the Trump administration sent “principles” for drug pricing to Congress, calling for legislation that would among other things, cap Medicare Part D beneficiary out-of-pocket pharmacy expenses, provide an option to cap Medicare Part D beneficiary monthly out-of-pocket expenses, and place limits on pharmaceutical price increases. Additionally, the Trump administration’s budget proposal for fiscal year 2021 includes a \$135 billion allowance to support legislative proposals seeking to reduce drug prices, increase competition, lower out-of-pocket drug costs for patients, and increase patient access to lower-cost generic and biosimilar drugs. Further, on July 24, 2020, the Trump administration announced four executive orders related to prescription drug pricing that attempt to implement several of the administration’s proposals, including a policy that would tie Medicare Part B drug prices to international drug prices; one that directs HHS to finalize the Canadian drug importation proposed rule previously issued by HHS and makes other changes allowing for personal importation of drugs from Canada; one that directs HHS to finalize the rulemaking process on modifying the federal Anti-Kickback Statute safe harbors for discounts for plans, pharmacies, and pharmaceutical benefit managers; and one that reduces costs of insulin and epipens to patients of federally qualified health centers. Although a number of these will require additional authorization to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. We expect that additional U.S. federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that the U.S. federal government will pay for healthcare products and services, which could result in reduced demand for our product candidates or additional pricing pressures and could seriously harm our business.

Individual states in the United States have also increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. Legally mandated price controls on payment amounts by third-party payors or other restrictions could seriously harm our business. In addition, regional healthcare authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and which suppliers will be included in their prescription drug and other healthcare programs. This could reduce the ultimate demand for our product candidates or put pressure on our product pricing. Furthermore, there has been increased interest by third-party payors and governmental authorities in reference pricing systems and publication of discounts and list prices. Prescription drugs and biological products that are in violation of these requirements will be included on a public list. These reforms could reduce the ultimate demand for our product candidates or put pressure on our product pricing and could seriously harm our business.

In the European Union, similar political, economic and regulatory developments may affect our ability to profitably commercialize our product candidates, if approved. In addition to continuing pressure on prices and cost containment measures, legislative developments at the European Union or member state level may result in significant additional requirements or obstacles that may increase our operating costs. The delivery of healthcare in the European Union, including the establishment and operation of health services and the pricing and reimbursement of medicines, is almost exclusively a matter for national, rather than European Union, law and policy. National governments and health service providers have different priorities and approaches to the delivery of health care and the pricing and reimbursement of products in that context. In general, however, the healthcare budgetary constraints in most European Union member states have resulted in restrictions on the pricing and reimbursement of medicines by relevant health service providers. Coupled with ever-increasing European Union and national regulatory burdens on those wishing to develop and market products,

this could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to commercialize our product candidates, if approved. In markets outside of the United States and European Union, reimbursement and healthcare payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies.

We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or judicial action in the United States, the European Union or any other jurisdiction. If we or any third parties we may engage are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we or such third parties are not able to maintain regulatory compliance, our product candidates may lose any regulatory approval that may have been obtained and we may not achieve or sustain profitability.

Even if we are able to commercialize any product candidates, due to unfavorable pricing regulations and/or third-party coverage and reimbursement policies, we may not be able to offer such products at competitive prices which would seriously harm our business.

The regulations that govern marketing approvals, pricing and reimbursement for new drugs vary widely from country to country. Some countries require approval of the sale price of a drug before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we might obtain marketing approval for a product in a particular country, but then be subject to price regulations that delay our commercial launch of the product, possibly for lengthy time periods, and negatively impact the revenue we are able to generate from the sale of the product in that country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more product candidates, even if any product candidates we may develop obtain marketing approval.

Our ability to successfully commercialize any products that we may develop also will depend in part on the extent to which reimbursement for these products and related treatments will be available from government health administration authorities, private health insurers, and other organizations. Government authorities and other third-party payors, such as private health insurers and health maintenance organizations, decide which medications they will pay for and establish reimbursement levels. A primary trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and other third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. Government authorities currently impose mandatory discounts for certain patient groups, such as Medicare, Medicaid and Veterans Affairs (VA) hospitals, and may seek to increase such discounts at any time. Future regulation may negatively impact the price of our products, if approved. Increasingly, other third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. For gene therapy and other products administered under the supervision of a physician, obtaining coverage and adequate reimbursement may be particularly difficult because of the higher prices often associated with such drugs. We cannot be sure that reimbursement will be available for any product candidate that we commercialize and, if reimbursement is available, that the level of reimbursement will be sufficient.

Reimbursement may impact the demand for, or the price of, any product candidate for which we obtain marketing approval. In order to get reimbursement, physicians may need to show that patients have superior treatment outcomes with our products compared to standard of care drugs, including lower-priced generic versions of standard of care drugs. If reimbursement is not available or is available only at limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval. In the United States, no uniform policy of coverage

and reimbursement for products exists among third-party payors and coverage and reimbursement levels for products can differ significantly from payor to payor. As a result, the coverage determination process is often a time consuming and costly process that may require us to provide scientific and clinical support for the use of our products to each payor separately, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance.

There may be significant delays in obtaining reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the medicine is approved by the FDA, EMA or other comparable foreign regulatory authorities. Moreover, eligibility for reimbursement does not imply that any drug will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale, and distribution. Interim reimbursement levels for new drugs, if applicable, may also not be sufficient to cover our costs and may not be made permanent. Reimbursement rates may vary according to the use of the drug and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost drugs and may be incorporated into existing payments for other services. Net prices for drugs may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their own reimbursement policies. Our inability to promptly obtain coverage and profitable payment rates from both government-funded and private payors for any approved products we may develop could seriously harm our business.

Even if we obtain FDA approval of any of our product candidates, we may never obtain approval or commercialize such products outside of the United States, which would limit our ability to realize their full market potential.

In order to market any products outside of the United States, we must establish and comply with numerous and varying regulatory requirements of other countries regarding safety and efficacy. Clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country does not mean that regulatory approval will be obtained in any other country. Approval procedures vary among countries and can involve additional product testing and validation and additional administrative review periods. Seeking foreign regulatory approvals could result in significant delays, difficulties and costs for us and may require additional preclinical studies or clinical trials which would be costly and time consuming. Regulatory requirements can vary widely from country to country and could delay or prevent the introduction of our products in those countries. Satisfying these and other regulatory requirements is costly, time consuming, uncertain and subject to unanticipated delays. In addition, our failure to obtain regulatory approval in any country may delay or have negative effects on the process for regulatory approval in other countries. We do not have any product candidates approved for sale in any jurisdiction, including international markets, and we do not have experience in obtaining regulatory approval in international markets. If we fail to comply with regulatory requirements in international markets or to obtain and maintain required approvals, our ability to realize the full market potential of our products will be harmed.

We currently have no sales organization. If we are unable to establish sales capabilities on our own or through third parties, we may not be able to market and sell any products effectively, if approved, or generate product revenue.

We currently do not have a marketing or sales organization. In order to commercialize any product, if approved, in the United States and foreign jurisdictions, we must build our marketing, sales, distribution, managerial and other non-technical capabilities or make arrangements with third parties to perform these services, and we may not be successful in doing so. In advance of any of our product candidates receiving regulatory approval, we expect to establish a sales organization with technical

expertise and supporting distribution capabilities to commercialize each such product candidate, which will be expensive and time-consuming. We have no prior experience in the marketing, sale and distribution of pharmaceutical products, and there are significant risks involved in building and managing a sales organization, including our ability to hire, retain, and incentivize qualified individuals, generate sufficient sales leads, provide adequate training to sales and marketing personnel, and effectively manage a geographically dispersed sales and marketing team. Any failure or delay in the development of our internal sales, marketing and distribution capabilities would adversely impact the commercialization of these products. We may choose to collaborate with third parties that have direct sales forces and established distribution systems, either to augment our own sales force and distribution systems or in lieu of our own sales force and distribution systems. If we are unable to enter into such arrangements on acceptable terms or at all, we may not be able to successfully commercialize our product candidates. If we are not successful in commercializing products, either on our own or through arrangements with one or more third parties, we may not be able to generate any future product revenue and we would incur significant additional losses and our business would be seriously harmed.

Our business operations and current and future relationships with investigators, healthcare professionals, consultants, third-party payors, patient organizations and customers will be subject to applicable healthcare regulatory laws, which could expose us to penalties and seriously harm our business.

Our business operations and current and future arrangements with investigators, healthcare professionals, consultants, third-party payors, patient organizations and customers, may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations. These laws may constrain the business or financial arrangements and relationships through which we conduct our operations, including how we research, market, sell and distribute our product candidates, if approved. Such laws include:

- the U.S. federal Anti-Kickback Statute, which prohibits, among other things, persons or entities from knowingly and willfully soliciting, offering, receiving or providing any remuneration (including any kickback, bribe, or certain rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, lease, order or recommendation of, any good, facility, item or service, for which payment may be made, in whole or in part, under any U.S. federal healthcare program, such as Medicare and Medicaid. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;
- the U.S. federal civil and criminal false claims and civil monetary penalties laws, including the civil federal False Claims Act, which can be enforced through civil whistleblower or *qui tam* actions, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, to the U.S. federal government, claims for payment or approval that are false or fraudulent, knowingly making, using or causing to be made or used, a false record or statement material to a false or fraudulent claim, or from knowingly making a false statement to avoid, decrease or conceal an obligation to pay money to the U.S. federal government. Pharmaceutical manufacturers can cause false claims to be presented to the U.S. federal government by engaging in impermissible marketing practices, such as the off-label promotion of a product for an indication for which it has not received FDA approval. In addition, the government may assert that a claim including items and services resulting from a violation of the U.S. federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act;
- the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA), which imposes criminal and civil liability for, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, or knowingly and

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willfully falsifying, concealing or covering up a material fact or making any materially false statement, in connection with the delivery of, or payment for, healthcare benefits, items or services. Similar to the U.S. federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the healthcare fraud statute implemented under HIPAA or specific intent to violate it in order to have committed a violation;

- the FDCA, which prohibits, among other things, the adulteration or misbranding of drugs, biologics and medical devices;
- the U.S. Public Health Service Act, which prohibits, among other things, the introduction into interstate commerce of a biological product unless a biologics license is in effect for that product;
- the U.S. Physician Payments Sunshine Act and its implementing regulations, which requires certain manufacturers of drugs, devices, biologics and medical supplies that are reimbursable under Medicare, Medicaid, or the Children's Health Insurance Program, with specific exceptions, to report annually to CMS information related to certain payments and other transfers of value to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. Beginning in 2022, applicable manufacturers also will be required to report such information regarding payments and transfers of value provided during the previous year to certain other healthcare providers, including physician assistants, nurse practitioners, clinical nurse specialists, certified nurse anesthetists, and certified nurse midwives;
- analogous U.S. state laws and regulations, including: state anti-kickback and false claims laws, which may apply to our business practices, including but not limited to, research, distribution, sales and marketing arrangements and claims involving healthcare items or services reimbursed by any third-party payor, including private insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the U.S. federal government, or otherwise restrict payments that may be made to healthcare providers and other potential referral sources; state laws and regulations that require drug manufacturers to file reports relating to pricing and marketing information, which requires tracking gifts and other remuneration and items of value provided to healthcare professionals and entities; and state and local laws requiring the registration of pharmaceutical sales representatives; and
- similar healthcare laws in the European Union and other jurisdictions, including reporting requirements detailing interactions with and payments to healthcare providers.

We may also be subject to additional federal laws, such as the U.S. Foreign Corrupt Practices Act of 1977, as amended, which prohibits, among other things, U.S. companies and their employees and agents from authorizing, promising, offering, or providing, directly or indirectly, corrupt or improper payments or anything else of value to foreign government officials, employees of public international organizations and foreign government owned or affiliated entities, candidates for foreign political office, and foreign political parties or officials thereof, and federal consumer protection and unfair competition laws, which broadly regulate marketplace activities and activities that potentially harm consumers.

Ensuring that our internal operations and future business arrangements with third parties comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices, including certain of our advisory board arrangements with physicians, some of whom are compensated in the form of stock or stock options, do not comply with current or future statutes, regulations, agency guidance or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of the laws described above or any other governmental laws and

regulations that may apply to us, we may be subject to significant penalties, including civil, criminal and administrative penalties, damages, fines, exclusion from government-funded healthcare programs, such as Medicare and Medicaid or similar programs in other countries or jurisdictions, integrity oversight and reporting obligations to resolve allegations of non-compliance, disgorgement, individual imprisonment, contractual damages, reputational harm, diminished profits and the curtailment or restructuring of our operations. If any of the physicians or other providers or entities with whom we expect to do business are found to not be in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs and imprisonment, which could affect our ability to operate our business. Further, defending against any such actions can be costly, time-consuming and may require significant personnel resources. Therefore, even if we are successful in defending against any such actions that may be brought against us, our business may be impaired.

We use and generate materials that may expose us to material liability.

Our research programs involve the use of hazardous materials and chemicals. We are subject to foreign, federal, state and local environmental and health and safety laws and regulations governing, among other matters, the use, manufacture, handling, storage and disposal of hazardous materials and waste products such as human tissue samples that may have the potential to transmit diseases. We may incur significant costs to comply with these current or future environmental and health and safety laws and regulations. In addition, we cannot completely eliminate the risk of contamination or injury from hazardous materials and may incur material liability as a result of such contamination or injury. In the event of an accident, an injured party may seek to hold us liable for any damages that result. Any liability could exceed the limits or fall outside the coverage of our workers' compensation, property and business interruption insurance and we may not be able to maintain insurance on acceptable terms, if at all. We currently carry no insurance specifically covering environmental claims.

Compliance with governmental regulations regarding the treatment of animals used in research could increase our operating costs, which would adversely affect the commercialization of our products.

The Animal Welfare Act (AWA) is the federal law that covers the treatment of certain animals used in research. Currently, the AWA imposes a wide variety of specific regulations that govern the humane handling, care, treatment and transportation of certain animals by producers and users of research animals, most notably relating to personnel, facilities, sanitation, cage size, and feeding, watering and shipping conditions. Third parties with whom we contract are subject to registration, inspections and reporting requirements under the AWA. Furthermore, some states have their own regulations, including general anti-cruelty legislation, which establish certain standards in handling animals. Comparable rules, regulations, and or obligations exist in many foreign jurisdictions. If we or our contractors fail to comply with regulations concerning the treatment of animals used in research, we may be subject to fines and penalties and adverse publicity, and our operations could be adversely affected.

Risks Related to Our Reliance on Third Parties

We expect to rely on third parties to conduct our clinical trials and some aspects of our research and preclinical testing, and those third parties may not perform satisfactorily, including failing to meet deadlines for the completion of such trials, research or testing.

We currently rely and expect to continue to rely on third parties, such as CROs, clinical data management organizations, clinical data assessments and analysis organizations, medical institutions

and clinical investigators, to conduct some aspects of our research, preclinical testing and clinical trials. Any of these third parties may terminate their engagements with us or be unable to fulfill their contractual obligations. If we need to enter into alternative arrangements, it would delay our product development activities.

Our reliance on these third parties for research and development activities reduces our control over these activities, but does not relieve us of our responsibilities. For example, we remain responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial. Moreover, the FDA requires us to comply with GCP for conducting, recording and reporting the results of clinical trials to assure that data and reported results are credible, reproducible and accurate and that the rights, integrity and confidentiality of trial participants are protected. We are also required to register ongoing clinical trials and to post the results of completed clinical trials on a government-sponsored database within certain timeframes. Failure to do so can result in fines, adverse publicity and civil and criminal sanctions.

If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our clinical trials in accordance with regulatory requirements or our stated protocols, we will not be able to obtain, or may be delayed in obtaining, marketing approvals for any product candidates we may develop and will not be able to, or may be delayed in our efforts to, successfully commercialize our medicines.

We also expect to rely on other third parties to store and distribute drug supplies for our clinical trials. Any performance failure on the part of our distributors could delay clinical development or marketing approval of any product candidates we may develop or commercialization of our product candidates, producing additional losses and depriving us of potential product revenue.

We may depend on collaborations with third parties for the research, development and commercialization of certain of the product candidates we may develop. If any such collaborations are not successful, we may not be able to realize the market potential of those product candidates.

We have sought, and may in the future seek third-party collaborators for the research, development and commercialization of certain of the product candidates we may develop. Our likely collaborators for any other collaboration arrangements include large and mid-size pharmaceutical companies, regional, national and international pharmaceutical companies, biotechnology companies and academic institutions. If we enter into any such arrangements with any third parties, we will likely have shared or limited control over the amount and timing of resources that our collaborators dedicate to the development or potential commercialization of any product candidates we may seek to develop with them. Our ability to generate revenue from these arrangements with commercial entities will depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements. We cannot predict the success of any collaboration that we enter into.

Collaborations involving our product candidates we may develop, pose the following risks to us:

- collaborators generally have significant discretion in determining the efforts and resources that they will apply to these collaborations;
- collaborators may not properly obtain, maintain, enforce or defend intellectual property or proprietary rights relating to our product candidates or may use our proprietary information in such a way as to expose us to potential litigation or other intellectual property related proceedings, including proceedings challenging the scope, ownership, validity and enforceability of our intellectual property;

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- collaborators may own or co-own intellectual property covering our product candidates that result from our collaboration with them, and in such cases, we may not have the exclusive right to commercialize such intellectual property or such product candidates;
- disputes may arise with respect to the ownership of intellectual property developed pursuant to collaborations;
- we may need the cooperation of our collaborators to enforce or defend any intellectual property we contribute to or that arises out of our collaborations, which may not be provided to us;
- collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability;
- disputes may arise between the collaborators and us that result in the delay or termination of the research, development or commercialization of our product candidates or that result in costly litigation or arbitration that diverts management attention and resources;
- collaborators may decide not to pursue development and commercialization of any product candidates we develop or may elect not to continue or renew development or commercialization programs based on clinical trial results, changes in the collaborator's strategic focus or available funding or external factors such as an acquisition that diverts resources or creates competing priorities;
- collaborators may delay clinical trials, provide insufficient funding for a clinical trial, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials, or require a new formulation of a product candidate for clinical testing;
- collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our product candidates if the collaborators believe that competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours;
- collaborators with marketing and distribution rights to one or more product candidates may not commit sufficient resources to the marketing and distribution of such product candidates;
- we may lose certain valuable rights under circumstances identified in our collaborations, including if we undergo a change of control;
- collaborators may undergo a change of control and the new owners may decide to take the collaboration in a direction which is not in our best interest;
- collaborators may become party to a business combination transaction and the continued pursuit and emphasis on our development or commercialization program by the resulting entity under our existing collaboration could be delayed, diminished or terminated;
- collaborators may become bankrupt, which may significantly delay our research or development programs, or may cause us to lose access to valuable technology, devices, materials, know-how or intellectual property of the collaborator relating to our products and product candidates;
- key personnel at our collaborators may leave, which could negatively impact our ability to productively work with our collaborators;
- collaborations may require us to incur short and long-term expenditures, issue securities that dilute our stockholders, or disrupt our management and business;
- collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable product candidates or our Therapeutic Vector Evolution platform technology; and

- collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner or at all.

We may face significant competition in seeking appropriate collaborations. Recent business combinations among biotechnology and pharmaceutical companies have resulted in a reduced number of potential collaborators. In addition, the negotiation process is time-consuming and complex, and we may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of the product candidate for which we are seeking to collaborate or delay its potential commercialization or reduce the scope of any sales or marketing activities, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to further develop product candidates or bring them to market and generate product revenue which could seriously harm our business.

If we enter into collaborations to develop and potentially commercialize any product candidates, we may not be able to realize the benefit of such transactions if we or our collaborator elect not to exercise the rights granted under the agreement or if we or our collaborator are unable to successfully integrate a product candidate into existing operations and company culture. In addition, if our agreement with any of our collaborators terminates, our access to technology and intellectual property licensed to us by that collaborator may be restricted or terminate entirely, which may delay our continued development of our product candidates utilizing the collaborator's technology or intellectual property or require us to stop development of those product candidates completely. We may also find it more difficult to find a suitable replacement collaborator or attract new collaborators, and our development programs may be delayed or the perception of us in the business and financial communities could be adversely affected. Any collaborator may also be subject to many of the risks relating to product development, regulatory approval, and commercialization described in this "Risk Factors" section, and any negative impact on our collaborators may adversely affect us.

Risks Related to Our Intellectual Property

Our success depends on our ability to protect our intellectual property and our proprietary technologies.

Our commercial success depends in part on our ability to obtain and maintain patent protection and trade secret protection for our product candidates, proprietary technologies and their uses as well as our ability to operate without infringing upon the proprietary rights of others. We generally seek to protect our proprietary position by filing patent applications in the United States and abroad related to our product candidates, proprietary technologies and their uses that are important to our business. Our patent applications cannot be enforced against third parties practicing the technology claimed in such applications unless, and until, patents issue from such applications, and then only to the extent the issued claims cover the technology. There can be no assurance that our patent applications or those of our licensors will result in additional patents being issued or that issued patents will afford sufficient protection against competitors with similar technology, nor can there be any assurance that the patents issued will not be infringed, designed around or invalidated by third parties. Even issued patents may later be found invalid or unenforceable or may be modified or revoked in proceedings instituted by third parties before various patent offices or in courts. Further, we have one pending patent application (patent no. 14/774,972), that was made with government support, that may be subject, under certain circumstances, to march-in-rights under 35 U.S.C. 203, which is a right that allows the government, in certain limited circumstances, to force a party with a license to intellectual property funded, at least in part, by the government, to grant a license to such property to another entity. This patent was made with the support of U.C. Berkeley and relates to our A101 vector. The degree of future protection for

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our proprietary rights is uncertain. Only limited protection may be available and may not adequately protect our rights or permit us to gain or keep any competitive advantage. If we do not adequately protect our intellectual property and proprietary technology, competitors may be able to use our product candidates and proprietary technologies and erode or negate any competitive advantage we may have, which could seriously harm our business.

We and our licensors have applied, and we intend to continue applying, for patents covering aspects of our product candidates, proprietary technologies and their uses that we deem appropriate. However, we may not be able to apply for patents on certain aspects of our current or future product candidates, proprietary technologies and their uses in a timely fashion, at a reasonable cost, in all jurisdictions, or at all, and any potential patent coverage we obtain may not be sufficient to prevent substantial competition.

The patent application process is subject to numerous risks and uncertainties, and there can be no assurance that we or any of our actual or potential future collaborators or licensors will be successful in protecting our product candidates, proprietary technologies and their uses by obtaining and defending patents. These risks and uncertainties include the following:

- the U.S. Patent and Trademark Office (USPTO) and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other provisions during the patent process, the noncompliance with which can result in abandonment or lapse of a patent or patent application, and partial or complete loss of patent rights in the relevant jurisdiction;
- patent applications may not result in any patents being issued;
- patents that may be issued or in-licensed may be challenged, invalidated, modified, revoked, circumvented, found to be unenforceable or otherwise may not provide any competitive advantage;
- our competitors, many of whom have substantially greater resources than we do and many of whom have made significant investments in competing technologies, may seek or may have already obtained patents that will limit, interfere with or eliminate our ability to make, use and sell our potential product candidates;
- other parties may have designed around our claims or developed technologies that may be related or competitive to our platform, may have filed or may file patent applications and may have received or may receive patents that overlap or conflict with our patent applications, either by claiming the same methods or devices or by claiming subject matter that could dominate our patent position;
- any successful opposition to any patents owned by or licensed to us could deprive us of rights necessary for the practice of our technologies or the successful commercialization of any products or product candidates that we may develop;
- because patent applications in the United States and most other countries are confidential for a period of time after filing, we cannot be certain that we or our licensors were the first to file any patent application related to our product candidates, proprietary technologies and their uses;
- an interference proceeding can be provoked by a third party or instituted by the USPTO to determine who was the first to invent any of the subject matter covered by the patent claims of our applications for any application with an effective filing date before March 16, 2013;
- there may be significant pressure on the U.S. government and international governmental bodies to limit the scope of patent protection both inside and outside the United States for disease treatments that prove successful, as a matter of public policy regarding worldwide health concerns; and

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- countries other than the United States may have patent laws less favorable to patentees than those upheld by U.S. courts, allowing foreign competitors a better opportunity to create, develop and market competing product candidates.

The patent prosecution process is also expensive and time-consuming, and we may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. Although we enter into non-disclosure and confidentiality agreements with parties who have access to patentable aspects of our research and development output, such as our employees, corporate collaborators, outside scientific collaborators, CROs, contract manufacturers, consultants and other third parties, any of these parties may breach such agreements and disclose such output before a patent application is filed, thereby jeopardizing our ability to seek patent protection.

The patent position of biopharmaceutical companies generally is highly uncertain, involves complex legal and factual questions, and has been the subject of much litigation in recent years. Moreover, the issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, and our patents, if issued, patents obtained by our collaborators or the patent rights that we license from others, may be challenged in the courts or patent offices in the United States and abroad. Once granted, patents may remain open to opposition, interference, re-examination, post-grant review, *inter partes* review, nullification or derivation action in court or before patent offices or similar proceedings for a given period after allowance or grant, during which time third parties can raise objections against such initial grant. Such challenges may result in loss of exclusivity or freedom to operate or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, which could limit our ability to stop others from using or commercializing similar or identical products or product candidates, or limit the duration of the patent protection of our product candidates. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our intellectual property may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

Our ability to enforce our patent rights depends on our ability to detect infringement. It may be difficult to detect infringers who do not advertise the components or methods that are used in connection with their products and services. Moreover, it may be difficult or impossible to obtain evidence of infringement in a competitor's or potential competitor's product or service. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded if we were to prevail may not be commercially meaningful.

In addition, proceedings to enforce or defend our patents could put our patents at risk of being invalidated, held unenforceable or interpreted narrowly. Such proceedings could also provoke third parties to assert claims against us, including that some or all of the claims in one or more of our patents are invalid or otherwise unenforceable. If any of our patents covering our product candidates are invalidated or found unenforceable, or if a court found that valid, enforceable patents held by third parties covered one or more of our product candidates, our competitive position could be harmed or we could be required to incur significant expenses to enforce or defend our rights. If we initiate lawsuits to protect or enforce our patents, or litigate against third-party claims, such proceedings would be expensive and would divert the attention of our management and technical personnel.

The degree of future protection for our proprietary rights is uncertain, and we cannot ensure that:

- any of our patents, or any of our pending patent applications, if issued, or those of our licensors, will include claims having a scope sufficient to protect our product candidates;

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- any of our pending patent applications or those of our licensors may issue as patents;
- others will not or may not be able to make, use, offer to sell, or sell products that are the same as or similar to our own but that are not covered by the claims of the patents that we own or license;
- we will be able to successfully commercialize our product candidates on a substantial scale, if approved, before the relevant patents that we own or license expire;
- we or our licensors were the first to make the inventions covered by each of the patents and pending patent applications that we own or license;
- we or our licensors were the first to file patent applications for these inventions;
- others will not develop similar or alternative technologies that do not infringe the patents we own or license;
- any of the patents we own or license will be found to ultimately be valid and enforceable;
- any patents issued to us or our licensors will provide a basis for an exclusive market for our commercially viable products or will provide us with any competitive advantages;
- a third party may not challenge the patents we own or license and, if challenged, a court would hold that such patents are valid, enforceable and infringed;
- we may develop or in-license additional proprietary technologies that are patentable;
- the patents of others will not have an adverse effect on our business;
- our competitors do not conduct research and development activities in countries where we do not have enforceable patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we will develop additional proprietary technologies or product candidates that are separately patentable; or
- our commercial activities or products will not infringe upon the patents of others.

Where we obtain licenses from or collaborate with third parties, in some circumstances, we may not have the right to control the preparation, filing and prosecution of patent applications, or to maintain the patents, covering technology that we license from third parties, or such activities, if controlled by us, may require the input of such third parties. We may also require the cooperation of our licensors and collaborators to enforce any licensed patent rights, and such cooperation may not be provided. Therefore, these patents and patent applications may not be prosecuted and enforced in a manner consistent with the best interests of our business. Moreover, if we do obtain necessary licenses, we will likely have obligations under those licenses, and any failure to satisfy those obligations could give our licensor the right to terminate the license. Termination of a necessary license, or expiration of licensed patents or patent applications, could seriously harm our business.

Furthermore, our owned and in-licensed intellectual property rights may be subject to a reservation of rights by one or more third parties. For example, the research resulting in certain of our in-licensed patent rights and technology was funded in part by the U.S. government. As a result, the government may have certain rights, or march-in rights, to such patent rights and technology. When new technologies are developed with government funding, the government generally obtains certain rights in any resulting patents, including a non-exclusive license authorizing the government to use the invention for non-commercial purposes. These rights may permit the government to disclose our confidential information to third parties and to exercise march-in rights to use or allow third parties to use our licensed technology. The government can exercise its march-in rights if it determines that

action is necessary because we fail to achieve practical application of the government-funded technology, because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to U.S. industry. In addition, our rights in such inventions may be subject to certain requirements to manufacture products embodying such inventions in the United States. Any exercise by the government of such rights could seriously harm our business.

The lives of our patents may not be sufficient to effectively protect our product candidates and business.

Patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after its first effective non-provisional filing date. Although various extensions may be available, the life of a patent, and the protection it affords, is limited. Even if patents covering our product candidates, proprietary technologies and their uses are obtained, once the patent life has expired, we may be open to competition. In addition, although upon issuance in the United States a patent's life can be extended based on certain delays caused by the USPTO and clinical development, this extension can be reduced or eliminated based on certain delays caused by the patent applicant during patent prosecution. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. If we do not have sufficient patent life to protect our product candidates, proprietary technologies and their uses, our business would be seriously harmed.

If we are unable to protect the confidentiality of our trade secrets, our business would be seriously harmed.

We rely on the protection of our trade secrets, including unpatented know-how, technology and other proprietary information to maintain our competitive position. We have taken steps to protect our trade secrets and unpatented know-how, including entering into confidentiality agreements with third parties, and confidential information and inventions agreements with employees and consultants. In addition to contractual measures, we try to protect the confidential nature of our proprietary information using commonly accepted physical and technological security measures. Despite these efforts, we cannot provide any assurances that all such agreements have been duly executed, and any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. In addition, such security measures may not provide adequate protection for our proprietary information, for example, in the case of misappropriation of a trade secret by an employee, consultant, customer or third party with authorized access. Our security measures may not prevent an employee, consultant, collaborator or customer or third party from misappropriating our trade secrets and providing them to a competitor, and recourse we take against such misconduct may not provide an adequate remedy to protect our interests fully. Monitoring unauthorized uses and disclosures is difficult, and we do not know whether the steps we have taken to protect our proprietary technologies will be effective. Unauthorized parties may also attempt to copy or reverse engineer certain aspects of our product candidates that we consider proprietary. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret can be difficult, expensive and time-consuming, and the outcome is unpredictable. Even though we use commonly accepted security measures, the criteria for protection of trade secrets can vary among different jurisdictions.

In addition, some courts inside and outside the United States are less willing or unwilling to protect trade secrets. Moreover, third parties may still obtain this information or may come upon this or similar information independently, and we would have no right to prevent them from using that technology or information to compete with us. Trade secrets will over time be disseminated within the industry through independent development, the publication of journal articles and the movement of personnel skilled in the art from company to company or academic to industry scientific positions.

Though our agreements with third parties typically restrict the ability of our employees, collaborators, licensors, third-party contractors and consultants to publish data potentially relating to our trade secrets, our agreements may contain certain limited publication rights. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position. Because from time to time we have relied on, and in future expect to rely on third parties in the development, manufacture, and distribution of our product candidates and provision of our services, we must, at times, share trade secrets with them. Despite employing the contractual and other security precautions described above, the need to share trade secrets increases the risk that such trade secrets become known by our competitors, are inadvertently incorporated into the technology of others, or are disclosed or used in violation of these agreements. If any of these events occurs or if we otherwise lose protection for our trade secrets, the value of this information may be greatly reduced and our competitive position would be harmed. If we do not apply for patent protection prior to such publication or if we cannot otherwise maintain the confidentiality of our proprietary technology and other confidential information, then our ability to obtain patent protection or to protect our trade secret information may be jeopardized.

Our rights to develop and commercialize our product candidates are subject in part to the terms and conditions of licenses granted to us by others, and the patent protection, prosecution and enforcement for some of our product candidates may be dependent on our licensors.

We currently are reliant upon licenses of certain patent rights and proprietary technology from third parties that are important or necessary to the development of our technology, including technology related to our product candidates. For example, we rely on our exclusive license agreements with U.C. Berkeley for all of our rights with respect to the intellectual property covering certain compositions of matter and methods of use of certain AAV variants related to our research candidates in lead optimization stage. These and other licenses we may enter into in the future may not provide adequate rights to use such intellectual property and technology in all relevant fields of use or in all territories in which we may wish to develop or commercialize our technology and product candidates in the future. As a result, we may not be able to develop and commercialize our technology and product candidates in fields of use and territories for which we are not granted rights pursuant to such licenses.

Licenses to additional third-party technology that may be required for our development programs may not be available in the future or may not be available on commercially reasonable terms, which could seriously harm our business.

In some circumstances, we may not have the right to control the preparation, filing, prosecution and enforcement of patent applications, or to maintain the patents, covering technology that we license from third parties. In addition, some of our agreements with our licensors require us to obtain consent from the licensor before we can enforce patent rights, and our licensor may withhold such consent or may not provide it on a timely basis. Therefore, we cannot be certain that our licensors or collaborators will prosecute, maintain, enforce and defend such intellectual property rights in a manner consistent with the best interests of our business, including by taking reasonable measures to protect the confidentiality of know-how and trade secrets, or by paying all applicable prosecution and maintenance fees related to intellectual property registrations for any of our product candidates. We also cannot be certain that our licensors have drafted or prosecuted the patents and patent applications licensed to us in compliance with applicable laws and regulations, which may affect the validity and enforceability of such patents or any patents that may issue from such applications. If they fail to do so, this could cause us to lose rights in any applicable intellectual property that we in-license, and as a result our

ability to develop and commercialize products or product candidates may be adversely affected and we may be unable to prevent competitors from making, using and selling competing products.

Our current licenses, and our future licenses likely will, impose various royalty payments, milestones, and other obligations on us. If we fail to comply with any of these obligations, we may be required to pay damages and the licensor may have the right to terminate the license. Termination by the licensor would cause us to lose valuable rights, and could prevent us from developing and commercializing our product candidates and proprietary technologies. Our business would be seriously harmed if any current or future licenses terminate, if the licensors fail to abide by the terms of the license, if the licensors fail to enforce licensed patents against infringing third parties, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms. Furthermore, if any current or future licenses terminate, or if the underlying patents fail to provide the intended exclusivity, competitors or other third parties may gain the freedom to seek regulatory approval of, and to market, products identical to ours. Moreover, our licensors may own or control intellectual property that has not been licensed to us and, as a result, we may be subject to claims, regardless of their merit, that we are infringing or otherwise violating the licensor's rights. In addition, while we cannot currently determine the amount of royalty obligations we would be required to pay on the sales of future products, if any, the amounts may be significant. The amount of our future royalty obligations will depend on the technology and intellectual property we use in product candidates that we successfully develop and commercialize, if any. Therefore, even if we successfully develop and commercialize any product candidates, we may be unable to achieve or maintain profitability.

If our trademarks and trade names, whether registered in the future or unregistered now, are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

Any trademarks we may register in the future or any current unregistered trademarks or trade names may be challenged, infringed, circumvented or declared generic or determined to be infringing on other marks. We may not be able to protect our rights to these trademarks and trade names, which we need to build name recognition among potential partners or customers in our markets of interest. At times, competitors may adopt trade names or trademarks similar to ours, thereby impeding our ability to build brand identity and possibly leading to market confusion. In addition, there could be potential trade name or trademark infringement claims brought by owners of other trademarks or trademarks that incorporate variations of our registered or unregistered trademarks or trade names. Over the long term, if we are unable to establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be adversely affected. We may license our trademarks and trade names, to the extent any are registered, to third parties, such as distributors. Though these license agreements may provide guidelines for how our trademarks and trade names may be used, a breach of these agreements or misuse of our trademarks and tradenames by our licensees may jeopardize our rights in or diminish the goodwill associated with our trademarks and trade names. Our efforts to enforce or protect our proprietary rights related to trademarks, trade names, trade secrets, domain names, copyrights or other intellectual property may be ineffective and could result in substantial costs and diversion of resources and could seriously harm our business.

Intellectual property rights do not necessarily address all potential threats to our competitive advantage.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations and may not adequately protect our business or permit us to maintain our competitive advantage. For example:

- others may be able to make gene therapy products that are similar to our product candidates or utilize similar gene therapy technology but that are not covered by the claims of the patents that we own or have exclusively licensed;
- we or our licensors or future collaborators might not have been the first to make the inventions covered by the issued patents or pending patent applications that we own or have exclusively licensed;
- we or our licensors or future collaborators might not have been the first to file patent applications covering certain of our inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our intellectual property rights;
- it is possible that our pending patent applications will not lead to issued patents;
- issued patents that we own or have exclusively licensed may be held invalid or unenforceable, as a result of legal challenges by our competitors;
- our competitors might conduct research and development activities in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we may not develop additional proprietary technologies that are patentable; and
- the patents of others may have an adverse effect on our business.

Should any of these events occur, they could seriously harm our business.

Any collaboration arrangements that we may enter into in the future may not be successful, which could adversely affect our ability to develop and commercialize our products.

Any future collaborations that we enter into may not be successful, such as our collaboration agreements with Pfizer that was terminated in 2018 and with AstraZeneca that concluded in 2020 without AstraZeneca exercising its option. The success of our collaboration arrangements will depend heavily on the efforts and activities of our collaborators. Collaborations are subject to numerous risks, which may include that:

- collaborators have significant discretion in determining the efforts and resources that they will apply to collaborations;
- collaborators may not pursue development and commercialization of our product candidates or may elect not to continue or renew development or commercialization programs based on trial or test results, changes in their strategic focus due to the acquisition of competitive products, availability of funding or other external factors, such as a business combination that diverts resources or creates competing priorities;
- collaborators could independently develop, or develop with third parties, products and product candidates that compete directly or indirectly with our product candidates;
- a collaborator with marketing, manufacturing and distribution rights to one or more products and product candidates may not commit sufficient resources to or otherwise not perform satisfactorily in carrying out these activities;

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- we could grant exclusive rights to our collaborators that would prevent us from collaborating with others;
- collaborators may not properly maintain or defend our intellectual property rights or may use our intellectual property or proprietary information in a way that gives rise to actual or threatened litigation that could jeopardize or invalidate our intellectual property or proprietary information or expose us to potential liability;
- disputes may arise between us and a collaborator that causes the delay or termination of the research, development or commercialization of our current or future product candidates or that results in costly litigation or arbitration that diverts management attention and resources;
- collaborations may be terminated, and, if terminated, may adversely affect the price of our common stock and may result in a need for additional capital to pursue further development or commercialization of the applicable current or future product candidates;
- collaborators may own or co-own intellectual property covering our product candidates that results from our collaborating with them, and in such cases, we would not have the exclusive right to develop or commercialize such intellectual property; and
- a collaborator's sales and marketing activities or other operations may not be in compliance with applicable laws resulting in civil or criminal proceedings.

Risks Related to Our Operations

We are highly dependent on our key personnel, and if we are not successful in attracting, motivating and retaining highly qualified personnel, we may not be able to successfully implement our business strategy.

Our ability to compete in the highly competitive biotechnology and pharmaceutical industries depends upon our ability to attract, motivate and retain highly qualified managerial, scientific and medical personnel. The loss of the services provided by any of our executive officers, other key employees, and other scientific and medical advisors, and our inability to find suitable replacements, could result in delays in the development of our product candidates and harm our business.

We conduct our operations at our facilities in Emeryville, California, in a region that is headquarters to many other biopharmaceutical companies and many academic and research institutions. Competition for skilled personnel is intense and the turnover rate can be high, which may limit our ability to hire and retain highly qualified personnel on acceptable terms or at all. We expect that we may need to recruit talent from outside of our region, and doing so may be costly and difficult.

To induce valuable employees to remain at our company, in addition to salary and cash incentives, we have provided stock option grants. The value to employees of these equity grants that vest over time may be significantly affected by movements in our stock price that are beyond our control, and may at any time be insufficient to counteract more lucrative offers from other companies. In addition, our employees are employed at-will, which means that any of our employees could leave our employment at any time, with or without notice. If we are unable to attract, incentivize and retain quality personnel on acceptable terms, or at all, it could seriously harm our business.

We will need to grow the size and capabilities of our organization, and we may experience difficulties in managing this growth.

As of September 30, 2020, we had 78 full-time employees. As our development plans and strategies develop, and as we transition into operating as a public company, we must add a significant

number of additional managerial, operational, financial and other personnel. Future growth will impose significant added responsibilities on members of management, including:

- identifying, recruiting, integrating, retaining and motivating additional employees;
- managing our internal development efforts effectively, including the clinical and FDA review process for our current and future product candidates, while complying with our contractual obligations to contractors and other third parties;
- expanding our operational, financial and management controls, reporting systems and procedures; and
- managing increasing operational and managerial complexity.

Our future financial performance and our ability to continue to develop and, if approved, commercialize our product candidates will depend, in part, on our ability to effectively manage any future growth. Our management may also have to divert a disproportionate amount of its attention away from day-to-day activities in order to manage these growth activities.

We currently rely, and for the foreseeable future will continue to rely, in substantial part on certain independent organizations, advisors and consultants to provide certain services. There can be no assurance that the services of these independent organizations, advisors and consultants will continue to be available to us on a timely basis when needed, or that we can find qualified replacements. In addition, if we are unable to effectively manage our outsourced activities or if the quality or accuracy of the services provided by consultants is compromised for any reason, our clinical trials may be extended, delayed, or terminated, and we may not be able to obtain regulatory approval of our product candidates or otherwise advance our business. There can be no assurance that we will be able to manage our existing consultants or find other competent outside contractors and consultants on economically reasonable terms, if at all.

If we are not able to effectively expand our organization by hiring new employees and expanding our groups of consultants and contractors, we may not be able to successfully implement the tasks necessary to further develop our product candidates and, accordingly, may not achieve our research, development and commercialization goals.

Unfavorable global economic conditions could adversely affect our business, financial condition or results of operations.

Our results of operations could be adversely affected by general conditions in the global economy and in the global financial markets. Portions of our future clinical trials may be conducted outside of the United States and unfavorable economic conditions resulting in the weakening of the U.S. dollar would make those clinical trials more costly to operate. Furthermore, a severe or prolonged economic downturn, including a recession or depression resulting from the current COVID-19 pandemic or political disruption could result in a variety of risks to our business, including weakened demand for our product candidates or any future product candidates, if approved, and our ability to raise additional capital when needed on acceptable terms, if at all. A weak or declining economy or political disruption, including any international trade disputes, could also strain our manufacturers or suppliers, possibly resulting in supply disruption, or cause our customers to delay making payments for our potential products. Any of the foregoing could seriously harm our business, and we cannot anticipate all of the ways in which the political or economic climate and financial market conditions could seriously harm our business.

The estimates of market opportunity and forecasts of market growth included in this prospectus may prove to be inaccurate, and even if the markets in which we compete achieve the forecasted growth, our business may not grow at similar rates, or at all.

Market opportunity estimates and growth forecasts included in this prospectus are subject to significant uncertainty and are based on assumptions and estimates which may not prove to be accurate. The estimates and forecasts included in this prospectus relating to size and expected growth of our target market may prove to be inaccurate. Even if the markets in which we compete meet the size estimates and growth forecasts included in this prospectus, our business may not grow at similar rates, or at all. Our growth is subject to many factors, including our success in implementing our business strategy, which is subject to many risks and uncertainties.

If we engage in acquisitions or strategic partnerships, this may increase our capital requirements, dilute our stockholders, cause us to incur debt or assume contingent liabilities and subject us to other risks.

We may engage in various acquisitions and strategic partnerships in the future, including licensing or acquiring complementary products, intellectual property rights, technologies or businesses. Any acquisition or strategic partnership may entail numerous risks, including:

- increased operating expenses and cash requirements;
- the assumption of indebtedness or contingent liabilities;
- the issuance of our equity securities which would result in dilution to our stockholders;
- assimilation of operations, intellectual property, products and product candidates of an acquired company, including difficulties associated with integrating new personnel;
- the diversion of our management's attention from our existing product candidates and initiatives in pursuing such an acquisition or strategic partnership;
- retention of key employees, the loss of key personnel, and uncertainties in our ability to maintain key business relationships;
- risks and uncertainties associated with the other party to such a transaction, including the prospects of that party and their existing products or product candidates and regulatory approvals; and
- our inability to generate revenue from acquired intellectual property, technology and/or products sufficient to meet our objectives or even to offset the associated transaction and maintenance costs.

In addition, if we undertake such a transaction, we may incur large one-time expenses and acquire intangible assets that could result in significant future amortization expense.

Our information technology systems, or those used by our third-party research institution collaborators, CROs or other contractors or consultants, may fail or suffer security breaches and other disruptions.

We have experienced cyberattacks, including a phishing attack in September 2019 in which the email account of a single non-officer employee was compromised. Our security controls detected the compromise, and we were able to block the unauthorized access, but not before the attacker was able to use the account to send out additional phishing emails. We do not believe the phishing attack was a material incursion because, among other reasons, we believe that none of our data was accessed or compromised, and we have not incurred any related material remediation costs. Despite the

implementation of security measures like those that detected the phishing attack, our internal information technology systems and those of our collaborators, future CROs and other contractors and consultants may be vulnerable to damage from computer viruses, natural disasters, terrorism, war, telecommunication and electrical failures, hacking, cyberattacks, phishing attacks and other social engineering schemes, denial or degradation of service attacks, unauthorized access or use, persons inside our organization, or persons with access to systems inside our organization. The risk of a security breach or disruption, particularly through cyberattacks or cyber intrusion, including by computer hackers, foreign governments and cyber terrorists, has generally increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased. The costs to us to investigate and mitigate network security problems, bugs, viruses, worms, malicious software programs and security vulnerabilities could be significant, and while we have implemented security measures to protect our data security and information technology systems, our efforts to address these problems may not be successful, and these problems could result in unexpected interruptions, delays, cessation of service, negative publicity and other harm to our business and our competitive position. Although to our knowledge we have not experienced any such material system failure or security breach to date, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations, whether due to a loss, corruption or unauthorized disclosure of our trade secrets, personal data or other proprietary or sensitive information or other similar disruptions.

For example, the loss of clinical trial data from completed, ongoing or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. If a security breach or other incident were to result in the unauthorized access to or unauthorized use, disclosure, release or other processing of clinical trial data or personal data, it may be necessary to notify individuals, governmental authorities, supervisory bodies, the media, and other parties pursuant to privacy and security laws. Likewise, we rely on our third-party research institution collaborators for research and development of our product candidates and other third parties for the manufacture of our product candidates and to conduct clinical trials, and similar events relating to their information technology systems could also seriously harm our business. Any security compromise affecting us, our partners or our industry, whether real or perceived, could harm our reputation, erode confidence in the effectiveness of our security measures, and lead to regulatory scrutiny. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or systems, or inappropriate disclosure of confidential or proprietary or personal information, we could incur liability, our competitive position could be harmed, and the further development and commercialization of our product candidates could be delayed.

Business disruptions could seriously harm our business.

Our operations, and those of our CROs, CMOs, suppliers, and other contractors and consultants, could be subject to earthquakes, power shortages, telecommunications failures, water shortages, floods, hurricanes, typhoons, fires, extreme weather conditions, medical epidemics and other natural or man-made disasters or business interruptions, for which we are partly uninsured. In addition, we rely on our third-party research institution collaborators for conducting research and development of our product candidates, and they may be affected by government shutdowns or withdrawn funding. The occurrence of any of these business disruptions could seriously harm our business.

All of our operations including our corporate headquarters are located in multiple facilities in Emeryville, California. Damage or extended periods of interruption to our corporate, development or research facilities due to fire, earthquake and other natural disaster, power loss, communications failure, unauthorized entry or other events could cause us to cease or delay development of some or all of our product candidates. Although we maintain property damage and business interruption insurance coverage on these facilities, our insurance might not cover all losses under such circumstances and our business could be seriously harmed by such delays and interruption.

Actual or perceived failures to comply with applicable data protection, privacy and security laws, regulations, standards and other requirements could adversely affect our business, results of operations, and financial condition.

The global data protection landscape is rapidly evolving, and we are or may become subject to numerous state, federal and foreign laws, requirements and regulations governing the collection, use, disclosure, retention, and security of personal data, such as information that we may collect in connection with clinical trials in the United States and abroad. Implementation standards and enforcement practices are likely to remain uncertain for the foreseeable future, and we cannot yet determine the impact future laws, regulations, standards, or perception of their requirements may have on our business. This evolution may create uncertainty in our business, affect our ability to operate in certain jurisdictions or to collect, store, transfer use and share personal information, necessitate the acceptance of more onerous obligations in our contracts, result in liability or impose additional costs on us. The cost of compliance with these laws, regulations and standards is high and is likely to increase in the future. Any failure or perceived failure by us to comply with federal, state or foreign laws or regulation, our internal policies and procedures or our contracts governing our processing of personal information could result in negative publicity, government investigations and enforcement actions, claims by third parties and damage to our reputation, any of which could seriously harm our business.

As our operations and business grow, we may become subject to or affected by new or additional data protection laws and regulations and face increased scrutiny or attention from regulatory authorities. In the United States, HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, and regulations implemented thereunder, imposes, among other things, certain standards on certain health care providers, health plans, and health care clearinghouses, known as covered entities, as well as their business associates that perform certain services that involve creating, receiving, maintaining or transmitting individually identifiable health information for or on behalf of such covered entities. Entities that are found to be in violation of HIPAA as the result of a breach of unsecured protected health information, a complaint about privacy practices or an audit by HHS, may be subject to significant civil, criminal and administrative fines and penalties and/or additional reporting and oversight obligations if required to enter into a resolution agreement and corrective action plan with HHS to settle allegations of HIPAA non-compliance. Such laws and regulations will be subject to interpretation by various courts and other governmental authorities, thus creating potentially complex compliance issues for us and our future customers and strategic partners. In addition, California enacted the California Consumer Privacy Act (CCPA) on June 28, 2018, which went into effect on January 1, 2020. The CCPA creates individual privacy rights for California consumers and increases the privacy and security obligations of entities handling certain personal data. The CCPA provides for civil penalties for violations, as well as a private right of action for data breaches that is expected to increase data breach litigation. The CCPA may increase our compliance costs and potential liability, and many similar laws have been proposed at the federal level and in other states. In the event that we are subject to or affected by HIPAA, the CCPA or other domestic privacy and data protection laws, any liability from failure to comply with the requirements of these laws could adversely affect our financial condition. In Europe, the GDPR went into effect in May 2018 and introduces strict requirements for processing the personal data of individuals within the European Economic Area (EEA) and the United Kingdom. The law is also developing rapidly and, in July 2020, the Court of Justice of the European Union limited how organizations could lawfully transfer personal data from the EU to the U.S. by invalidating the EU-U.S. Privacy Shield as a basis for transfers of personal data from the EU to the U.S. and raising questions about the continued validity of one of the primary alternatives to the EU-U.S. Privacy Shield, namely the European Commission's Standard Contractual Clauses. At present, there are few, if any, viable alternatives to the EU-U.S. Privacy Shield and the Standard Contractual Clauses. Inability to transfer personal information from the European Union, Switzerland or United Kingdom to the United States or elsewhere, may restrict our activities in those jurisdictions and limit our ability to provide our products and services in those

jurisdictions. Companies that must comply with the GDPR face increased compliance obligations and risk, including more robust regulatory enforcement of data protection requirements and potential fines for noncompliance of up to €20 million or 4% of the annual global revenues of the noncompliant company, whichever is greater. Relatedly, following the departure of the United Kingdom from the EU after the expiry of the transition period, the United Kingdom will operate a separate but similar regime to the EU, which allows for fines of up to £17.5 million or 4% of the total worldwide annual turnover of the preceding financial year.

Although we work to comply with applicable laws, regulations and standards, our contractual obligations and other legal obligations, these requirements are evolving and may be modified, interpreted and applied in an inconsistent manner from one jurisdiction to another, and may conflict with one another or other legal obligations with which we must comply. Any failure or perceived failure by us or our employees, representatives, contractors, consultants, CROs, collaborators, or other third parties to comply with such requirements or adequately address privacy and security concerns, even if unfounded, could result in additional cost and liability to us, damage our reputation, and seriously harm our business.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

Under Sections 382 and 383 of the United States Internal Revenue Code of 1986, as amended (the Code), if a corporation undergoes an “ownership change” (generally defined as a greater than 50-percentage-point cumulative change (by value) in the equity ownership of certain stockholders over a rolling three-year period), the corporation’s ability to use its pre-change net operating loss carryforwards (NOLs) and other pre-change tax attributes to offset its post-change taxable income or taxes may be limited. If finalized, Treasury Regulations currently proposed under Section 382 of the Code may further limit our ability to utilize our pre-change NOLs or other pre-change tax attributes if we undergo a future ownership change. We have experienced ownership changes in the past. We may also experience ownership changes as a result of this offering or as a result of subsequent shifts in our stock ownership, some of which are outside our control. As a result, our ability to use our NOLs and other pre-change tax attributes to offset post-change taxable income or taxes may be subject to limitation. We will be unable to use our NOLs or other tax attributes if we do not attain profitability sufficient to offset our available NOLs or other tax attributes prior to their expiration, to the extent subject to expiration.

Changes in tax laws or regulations that are applied adversely to us or our customers may seriously harm our business.

New income, sales, use or other tax laws, statutes, rules, regulations or ordinances could be enacted at any time, which could affect the tax treatment of any of our future domestic and foreign earnings. Any new taxes could adversely affect our domestic and international business operations, and our business and financial performance. Further, existing tax laws, statutes, rules, regulations or ordinances could be interpreted, changed, modified or applied adversely to us.

Risks Related to This Offering and Ownership of Our Common Stock

We do not know whether an active market will develop for our common stock or what the market price of our common stock will be, and, as a result, it may be difficult for you to sell your shares of our common stock.

Before this offering, there was no public trading market for our common stock. If an active market for our common stock does not develop or is not sustained, it may be difficult for you to sell your

shares of our common stock at an attractive price, or at all. We cannot predict the prices at which our common stock will trade. It is possible that in one or more future periods our results of operations and progression of our product pipeline may not meet the expectations of public market analysts and investors, and, as a result of these and other factors including those identified in this “Risk Factors” section, the price of our common stock may fall.

The market price of our common stock may be volatile, which could result in substantial losses for investors purchasing shares in this offering.

The initial public offering price for our common stock was determined through negotiations with the underwriters. This initial public offering price may differ from the market price of our common stock after the offering. As a result, you may not be able to sell your common stock at or above the initial public offering price. Some of the factors that may cause the market price of our common stock to fluctuate include:

- results from, and any delays in, our clinical trials for our clinical-stage product candidates or any other future clinical development programs, including any delays related to the COVID-19 pandemic;
- the success of existing or new competitive products or technologies;
- commencement or termination of collaborations for our product candidates;
- failure or discontinuation of any of our product candidates;
- failure to develop our Therapeutic Vector Evolution platform technology;
- results of preclinical studies, clinical trials or regulatory approvals of product candidates of our competitors, or announcements about new research programs or product candidates of our competitors;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- the commencement of litigation;
- the level of expenses related to any of the research programs or product candidates that we may develop;
- the results of our efforts to develop additional product candidates or products;
- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us, our insiders, or other stockholders;
- expiration of market standoff or lock-up agreements;
- variations in our financial results or those of companies that are perceived to be similar to us;
- changes in estimates or recommendations by securities analysts, if any, that cover our stock;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors;

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- general economic, industry, and market conditions; and
- the other factors described in this “Risk Factors” section.

In recent years, the stock market in general, and the market for pharmaceutical and biotechnology companies in particular, has experienced significant price and volume fluctuations that have often been unrelated or disproportionate to changes in the operating performance of the companies whose stock is experiencing those price and volume fluctuations. Further, the stock market in general has been highly volatile due to the COVID-19 pandemic and political uncertainty in the United States. Broad market and industry factors may seriously affect the market price of our common stock, regardless of our actual operating performance. These fluctuations may be even more pronounced in the trading market for our stock shortly following this offering. Following periods of such volatility in the market price of a company's securities, securities class action litigation has often been brought against that company. Because of the potential volatility of our stock price, we may become the target of securities litigation in the future. Securities litigation could result in substantial costs and divert management's attention and resources from our business.

If securities analysts do not publish research or reports about our business or if they publish negative evaluations of our stock, the price of our stock could decline.

The trading market for our common stock will rely in part on the research and reports that industry or financial analysts publish about us or our business. We do not currently have and may never obtain research coverage by industry or financial analysts. If no or few analysts commence coverage of us, the trading price of our stock could decrease. Even if we do obtain analyst coverage, if one or more of the analysts covering our business downgrade their evaluations of our stock, the price of our stock could decline. If one or more of these analysts cease to cover our stock, we could lose visibility in the market for our stock, which in turn could cause our stock price to decline.

A significant portion of our total outstanding shares is restricted from immediate resale but may be sold into the market in the near future, which could cause the market price of our common stock to decline significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. These sales, upon the expiration of the market standoff and lock-up agreements, the early release of these agreements or the perception in the market that the holders of a large number of shares of our common stock intend to sell shares, could reduce the market price of our common stock. After this offering and after giving effect to the automatic conversion of 11,575,984 outstanding shares of our redeemable convertible preferred stock into 11,575,984 shares of our common stock immediately prior to the completion of this offering, we will have 21,595,630 shares of our common stock outstanding based on 5,257,742 shares of our common stock outstanding as of September 30, 2020. Of these shares, the 4,761,904 shares we are selling in this offering may be resold in the public market immediately, unless purchased by our affiliates. The remaining 16,833,726 shares, or 77.9% of our outstanding shares after this offering, are currently prohibited or otherwise restricted under securities laws, market standoff agreements entered into by our stockholders with us, or lock-up agreements entered into by our stockholders with the underwriters. However, subject to applicable securities law restrictions and excluding shares of restricted stock that will remain unvested, prohibitions and restrictions on the sale of these shares in the public market will be lifted beginning 180 days after the date of this prospectus. Goldman Sachs & Co. LLC, BofA Securities, Inc. and Evercore Group L.L.C. may, in their sole discretion, release all or some portion of the shares subject to lock-up agreements at any time and for any reason. Shares issued upon the exercise of stock options outstanding under our equity incentive plans, or pursuant to future awards granted under those plans, will become available for sale in the public market to the extent permitted by the provisions of

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applicable vesting schedules, any applicable market standoff and lock-up agreements, and Rule 144 and Rule 701 under the Securities Act of 1933, as amended (the Securities Act). See the section of this prospectus titled “Shares Eligible for Future Sale” for additional information.

Moreover, after this offering, holders of an aggregate of 11.6 million shares of our common stock will have rights, subject to conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders. We also plan to register all shares of our common stock that we may issue under our equity compensation plans. Once we register these shares, they can be freely sold in the public market upon issuance and once vested, subject to volume limitations applicable to affiliates and the lock-up agreements described in the section of this prospectus titled “Underwriters.” If any of these additional shares are sold, or if it is perceived that they will be sold, in the public market, the market price of our common stock could decline.

Raising additional capital may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies or product candidates.

We will seek additional capital through one or a combination of public and private equity offerings, debt financings, strategic partnerships and alliances and licensing arrangements. We, and indirectly, our stockholders, will bear the cost of issuing and servicing such securities. Because our decision to issue debt or equity securities in any future offering will depend on market conditions and other factors beyond our control, we cannot predict or estimate the amount, timing or nature of any future offerings. To the extent that we raise additional capital through the sale of equity securities, your ownership interest will be diluted, and the terms may include liquidation or other preferences that adversely affect your rights as a stockholder. The incurrence of indebtedness would result in increased fixed payment obligations and could involve restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire, sell or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. Additionally, any future collaborations we enter into with third parties may provide capital in the near term but limit our potential cash flow and revenue in the future. If we raise additional funds through strategic partnerships and alliances and licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies or product candidates, or grant licenses on terms unfavorable to us.

Insiders will continue to have substantial influence over us after this offering, which could limit your ability to affect the outcome of key transactions, including a change of control.

After this offering, our directors, executive officers, holders of more than 5% of our outstanding stock and their respective affiliates will beneficially own shares representing approximately % of our outstanding common stock. As a result, these stockholders, if they act together, will be able to influence our management and affairs and all matters requiring stockholder approval, including the election of directors and approval of significant corporate transactions. This concentration of ownership may have the effect of delaying or preventing a change in control of our company and might affect the market price of our common stock.

We are an “emerging growth company” and a “smaller reporting company” and as a result of the reduced disclosure and governance requirements applicable to emerging growth companies and smaller reporting companies, our common stock may be less attractive to investors.

We are an “emerging growth company,” as defined in the JOBS Act, and we intend to take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404, reduced disclosure obligations

regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. In addition, as an “emerging growth company” the JOBS Act allows us to delay adoption of new or revised accounting pronouncements applicable to public companies until such pronouncements are made applicable to private companies. We have elected to use this extended transition period under the JOBS Act. As a result, our financial statements may not be comparable to the financial statements of issuers who are required to comply with the effective dates for new or revised accounting standards that are applicable to public companies, which may make comparison of our financials to those of other public companies more difficult.

We cannot predict if investors will find our common stock less attractive because we will rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile. We may take advantage of these reporting exemptions until we are no longer an emerging growth company. We will remain an emerging growth company until the earlier of (1) the last day of the year following the fifth anniversary of the consummation of this offering, (2) the last day of the year in which we have total annual gross revenue of at least \$1.07 billion, (3) the last day of the year in which we are deemed to be a “large accelerated filer” as defined in Rule 12b-2 under the Exchange Act, which would occur if the market value of our common stock held by non-affiliates exceeded \$700.0 million as of the last business day of the second fiscal quarter of such year or (4) the date on which we have issued more than \$1.0 billion in non-convertible debt securities during the prior three-year period.

Even after we no longer qualify as an “emerging growth company,” we may still qualify as a “smaller reporting company,” which would allow us to continue to take advantage of many of the same exemptions from disclosure requirements, including, among other things, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, presenting only the two most recent fiscal years of audited financial statements in our Annual Report on Form 10-K and reduced disclosure obligations regarding executive compensation in this prospectus and our periodic reports and proxy statements.

We will incur significant costs as a result of operating as a public company, and our management will devote substantial time to new compliance initiatives. We may fail to comply with the rules that apply to public companies, including Section 404 of the Sarbanes-Oxley Act of 2002, which could result in sanctions or other penalties that would seriously harm our business.

We will incur significant legal, accounting and other expenses as a public company, including costs resulting from public company reporting obligations under the Exchange Act and regulations regarding corporate governance practices. The listing requirements of the Nasdaq Global Market and the rules of the Securities and Exchange Commission (SEC) require that we satisfy certain corporate governance requirements relating to director independence, filing annual and interim reports, stockholder meetings, approvals and voting, soliciting proxies, conflicts of interest and a code of conduct. Our management and other personnel will need to devote a substantial amount of time to ensure that we comply with all of these requirements. Moreover, the reporting requirements, rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. Any changes we make to comply with these obligations may not be sufficient to allow us to satisfy our obligations as a public company on a timely basis, or at all. These reporting requirements, rules and regulations, coupled with the increase in potential litigation exposure associated with being a public company, could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors or board committees or to serve as executive officers, or to obtain certain types of insurance, including directors’ and officers’ insurance, on acceptable terms.

After this offering, we will be subject to Section 404 of The Sarbanes-Oxley Act of 2002 (Section 404) and the related rules of the SEC, which generally require our management and independent registered public accounting firm to report on the effectiveness of our internal control over financial reporting. Beginning with the second annual report that we will be required to file with the SEC, Section 404 requires an annual management assessment of the effectiveness of our internal control over financial reporting. However, for so long as we remain an emerging growth company as defined in the JOBS Act, we intend to take advantage of certain exemptions from various reporting requirements that are applicable to public companies that are not emerging growth companies, including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404. Once we are no longer an emerging growth company or, if prior to such date, we opt to no longer take advantage of the applicable exemption, we will be required to include an opinion from our independent registered public accounting firm on the effectiveness of our internal controls over financial reporting.

To date, we have never conducted a review of our internal control for the purpose of providing the reports required by these rules. During the course of our review and testing, we may identify deficiencies and be unable to remediate them before we must provide the required reports. Furthermore, if we have a material weakness in our internal controls over financial reporting, we may not detect errors on a timely basis and our financial statements may be materially misstated. We or our independent registered public accounting firm may not be able to conclude on an ongoing basis that we have effective internal control over financial reporting, which could harm our operating results, cause investors to lose confidence in our reported financial information and cause the trading price of our stock to fall. In addition, as a public company we will be required to file accurate and timely quarterly and annual reports with the SEC under the Exchange Act. In order to report our results of operations and financial statements on an accurate and timely basis, we will depend in part on CROs to provide timely and accurate notice of their costs to us. Any failure to report our financial results on an accurate and timely basis could result in sanctions, lawsuits, delisting of our shares from the Nasdaq Global Market or other adverse consequences that would seriously harm our business.

Purchasers in this offering will experience immediate and substantial dilution in the book value of their investment.

The initial public offering price of our common stock is substantially higher than the pro forma net tangible book value per share of our common stock before giving effect to this offering. Accordingly, if you purchase our common stock in this offering, you will incur immediate substantial dilution of \$13.59 per share, based on an assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, and our pro forma net tangible book value as of September 30, 2020. In addition, following this offering, purchasers in this offering will have contributed approximately 35.1% of the total gross consideration paid by stockholders to us to purchase shares of our common stock, through September 30, 2020, but will own only approximately 22.1% of the shares of our common stock outstanding immediately after this offering. Furthermore, if the underwriters exercise their option to purchase additional shares, or outstanding options and warrants are exercised, you could experience further dilution. For a further description of the dilution that you will experience immediately after this offering, see the section titled "Dilution."

Delaware law and provisions in our certificate of incorporation and bylaws that will become effective upon the closing of this offering might discourage, delay, or prevent a change in control of our company or changes in our management and, therefore, depress the trading price of our common stock.

Provisions in our certificate of incorporation and bylaws that will become effective upon the closing of this offering may discourage, delay, or prevent a merger, acquisition, or other change in

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control that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares of our common stock. These provisions may also prevent or frustrate attempts by our stockholders to replace or remove our management. Therefore, these provisions could adversely affect the price of our common stock. Among other things, our charter documents will:

- provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum;
- eliminate cumulative voting in the election of directors;
- authorize our board of directors to issue shares of preferred stock and determine the price and other terms of those shares, including preferences and voting rights, without stockholder approval;
- provide our board of directors with the exclusive right to elect a director to fill a vacancy or newly created directorship;
- provide that our directors may be removed only for cause;
- permit stockholders to only take actions at a duly called annual or special meeting and not by written consent;
- prohibit stockholders from calling a special meeting of stockholders;
- provide for a staggered board, which will result in only a few directors being up for re-election in each calendar year;
- require that stockholders give advance notice to nominate directors or submit proposals for consideration at stockholder meetings;
- authorize our board of directors, by a majority vote, to amend the bylaws;
- require the affirmative vote of at least 66 2/3% or more of the outstanding shares of our common stock to amend many of the provisions described above; and
- limit the liability of, and provide indemnification to, our directors and officers.

In addition, Section 203 of the General Corporation Law of the State of Delaware (DGCL) prohibits a publicly-held Delaware corporation from engaging in a business combination with an interested stockholder, generally a person which together with its affiliates owns, or within the last three years has owned, 15% of our voting stock, for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner.

Any provision of our certificate of incorporation, bylaws, or Delaware law that has the effect of delaying or preventing a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our capital stock and could also affect the price that some investors are willing to pay for our common stock.

Claims for indemnification by our directors and officers may reduce our available funds to satisfy successful third-party claims against us and may reduce the amount of money available to us.

Our amended and restated certificate of incorporation and amended and restated bylaws will provide that we will indemnify our directors and officers, in each case to the fullest extent permitted by Delaware law.

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In addition, as permitted by Section 145 of the Delaware General Corporation Law, our amended and restated bylaws to be effective immediately prior to the completion of this offering and our indemnification agreements that we have entered into with our directors and officers will provide that:

- We will indemnify our directors and officers for serving us in those capacities or for serving other business enterprises at our request, to the fullest extent permitted by Delaware law. Delaware law provides that a corporation may indemnify such person if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to the best interests of the registrant and, with respect to any criminal proceeding, had no reasonable cause to believe such person's conduct was unlawful.
- We may, in our discretion, indemnify employees and agents in those circumstances where indemnification is permitted by applicable law.
- We are required to advance expenses, as incurred, to our directors and officers in connection with defending a proceeding, except that such directors or officers shall undertake to repay such advances if it is ultimately determined that such person is not entitled to indemnification.
- We will not be obligated pursuant to our amended and restated bylaws to indemnify a person with respect to proceedings initiated by that person against us or our other indemnitees, except with respect to proceedings authorized by our board of directors or brought to enforce a right to indemnification.
- The rights conferred in our amended and restated bylaws are not exclusive, and we are authorized to enter into indemnification agreements with our directors, officers, employees and agents and to obtain insurance to indemnify such persons.
- We may not retroactively amend our amended and restated bylaw provisions to reduce our indemnification obligations to directors, officers, employees and agents.

Our amended and restated certificate of incorporation and amended and restated bylaws will provide that the Court of Chancery of the State of Delaware will be the exclusive forum for certain disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated certificate of incorporation and amended and restated bylaws will provide that the Court of Chancery of the State of Delaware (or, in the event that the Court of Chancery does not have jurisdiction, the federal district court for the District of Delaware or other state courts of the State of Delaware) is the exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a claim of breach of fiduciary duty, any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws, or any action asserting a claim against us that is governed by the internal affairs doctrine; provided that, the exclusive forum provision will not apply to suits brought to enforce any liability or duty created by the Exchange Act or any other claim for which the federal courts have exclusive jurisdiction; and provided further that, if and only if the Court of Chancery of the State of Delaware dismisses any such action for lack of subject matter jurisdiction, such action may be brought in another state or federal court sitting in the State of Delaware. Our amended and restated certificate of incorporation and amended and restated bylaws will also provide that the federal district courts of the United States of America will be the exclusive forum for the resolution of any complaint asserting a cause of action against us or any of our directors, officers, employees or agents and arising under the Securities Act. Nothing in our amended and restated certificate of incorporation and amended and restated bylaws precludes stockholders that assert claims under the Exchange Act from bringing such claims in state or federal court, subject to applicable law.

This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or any of our directors, officers, other employees or

stockholders, which may discourage lawsuits with respect to such claims, although our stockholders will not be deemed to have waived our compliance with federal securities laws and the rules and regulations thereunder. Furthermore, the enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that a court could find these types of provisions to be inapplicable or unenforceable. While the Delaware courts have determined that such choice of forum provisions are facially valid, a stockholder may nevertheless seek to bring a claim in a venue other than those designated in the exclusive forum provisions, and there can be no assurance that such provisions will be enforced by a court in those other jurisdictions. If a court were to find the choice of forum provision that will be contained in our amended and restated certificate of incorporation and amended and restated bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could seriously harm our business.

We do not currently intend to pay dividends on our common stock, and, consequently, your ability to achieve a return on your investment will depend on appreciation in the price of our common stock.

We do not currently intend to pay any cash dividends on our common stock for the foreseeable future. We currently intend to invest our future earnings, if any, to fund our growth. Therefore, you are not likely to receive any dividends on your common stock for the foreseeable future. Since we do not intend to pay dividends, your ability to receive a return on your investment will depend on any future appreciation in the market value of our common stock. There is no guarantee that our common stock will appreciate or even maintain the price at which our holders have purchased it.

General Risk Factors

Any legal proceedings or claims against us could be costly and time-consuming to defend and could harm our reputation regardless of the outcome.

We are and may in the future become subject to legal proceedings and claims that arise in the ordinary course of business, such as disputes or employment claims made by our current or former employees. Any litigation, whether meritorious or not, could harm our reputation, will increase our costs and may divert management's attention, time and resources, which may in turn seriously harm our business. Insurance might not cover such claims, might not provide sufficient payments to cover all the costs to resolve one or more such claims, and might not continue to be available on terms acceptable to us. A claim brought against us that is uninsured or underinsured could result in unanticipated costs and could seriously harm our business.

If product liability lawsuits are brought against us, we may incur substantial liabilities and may be required to limit commercialization of our product candidates.

We face an inherent risk of product liability as a result of the clinical testing of our product candidates and will face an even greater risk when and if we commercialize any products. For example, we may be sued if our product candidates cause or are perceived to cause injury or are found to be otherwise unsuitable during clinical testing, manufacturing, marketing or sale. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict liability or a breach of warranties. Claims could also be asserted under state consumer protection acts. If we cannot successfully defend ourselves against product liability claims, we may incur substantial liabilities or be required to cease commercialization of our product candidates. Even successful defense would require significant financial and management resources. Regardless of the merits or eventual outcome, liability claims may result in:

- decreased or interrupted demand for our products;

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- substantial monetary awards to trial participants or patients;
- product recalls, withdrawals or labeling, marketing or promotional restrictions;
- injury to our reputation;
- withdrawal of clinical trial participants and inability to continue clinical trials;
- initiation of investigations by regulators;
- costs to defend the related litigation;
- a diversion of management's time and our resources;
- loss of revenue;
- exhaustion of any available insurance and our capital resources;
- the inability to commercialize any product candidate; and
- a decline in our share price.

Our inability to obtain sufficient product liability insurance at an acceptable cost to protect against potential product liability claims could prevent or inhibit the commercialization of products we develop, alone or with collaborators. Our insurance policies may have various exclusions, and we may be subject to a product liability claim for which we have no coverage. We may have to pay any amounts awarded by a court or negotiated in a settlement that exceed our coverage limitations or that are not covered by our insurance, and we may not have, or be able to obtain, sufficient capital to pay such amounts. Even if our agreements with any future corporate collaborators entitle us to indemnification against losses, such indemnification may not be available or adequate should any claim arise.

Our employees, independent contractors, consultants, research or commercial partners or collaborators and vendors may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements.

We are exposed to the risk of fraud, misconduct or other illegal activity by our employees, independent contractors, consultants, research or commercial partners or other collaborators, including the foundations we work with, and vendors. Misconduct by these parties could include intentional, reckless and negligent conduct that fails to: comply with the laws of the FDA, EMA and other comparable foreign regulatory authorities; provide true, complete and accurate information to the FDA, EMA and other comparable foreign regulatory authorities; comply with manufacturing standards we have established; comply with healthcare fraud and abuse laws in the United States and similar foreign fraudulent misconduct laws; or report financial information or data accurately or to disclose unauthorized activities to us. If we obtain FDA approval of any of our product candidates and begin commercializing those products in the United States, our potential exposure under such laws will increase significantly, and our costs associated with compliance with such laws are also likely to increase. In particular, research, sales, marketing, education and other business arrangements in the healthcare industry are subject to extensive laws designed to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, educating, marketing and promotion, sales and commission, certain customer incentive programs and other business arrangements generally. Activities subject to these laws also involve the improper use of information obtained in the course of patient recruitment for clinical trials, which could result in regulatory sanctions and cause serious harm to our reputation. It is not always possible to identify and deter misconduct by employees and third parties, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws. In addition, we are subject to the risk that a person or

government could allege such fraud or other misconduct, even if none occurred. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could seriously harm our business, including the imposition of significant fines or other sanctions.

If we or any contract manufacturers and suppliers we engage fail to comply with environmental, health, and safety laws and regulations, we could become subject to fines or penalties or incur costs that could seriously harm our business.

We and any contract manufacturers and suppliers we engage are subject to numerous federal, state and local environmental, health, and safety laws, regulations, and permitting requirements, including those governing laboratory procedures; the generation, handling, use, storage, treatment and disposal of hazardous and regulated materials and wastes; the emission and discharge of hazardous materials into the ground, air and water; and employee health and safety. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. Under certain environmental laws, we could be held responsible for costs relating to any contamination at our current or past facilities and at third-party facilities. We also could incur significant costs associated with civil or criminal fines and penalties.

Compliance with applicable environmental laws and regulations may be expensive, and current or future environmental laws and regulations may impair our research, product development and manufacturing efforts. In addition, we cannot entirely eliminate the risk of accidental injury or contamination from these materials or wastes. Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials, this insurance may not provide adequate coverage against potential liabilities. We do not carry specific biological or hazardous waste insurance coverage, and our property, casualty, and general liability insurance policies specifically exclude coverage for damages and fines arising from biological or hazardous waste exposure or contamination. Accordingly, in the event of contamination or injury, we could be held liable for damages or be penalized with fines in an amount exceeding our resources, and our clinical trials or regulatory approvals could be suspended, which could seriously harm our business.

Reliance on third parties requires us to share our trade secrets, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Reliance on third parties to conduct clinical trials, assist in research and development and to manufacture our product candidates, will at times require us to share trade secrets with them. We seek to protect our proprietary technology by in part entering into confidentiality agreements and, if applicable, material transfer agreements, consulting agreements or other similar agreements with our advisors, employees, third-party contractors and consultants prior to beginning research or disclosing proprietary information. These agreements typically limit the rights of the third parties to use or disclose our confidential information, including our trade secrets. Despite the contractual provisions employed when working with third parties, the need to share trade secrets and other confidential information increases the risk that such trade secrets become known by our competitors, are inadvertently incorporated into the technology of others, or are disclosed or used in violation of these agreements. Given that our proprietary position is based, in part, on our know-how and trade secrets, a competitor's independent discovery of our trade secrets or other unauthorized use or disclosure would impair our competitive position and may seriously harm our business.

We may fail to comply with any of our obligations under existing or future agreements pursuant to which we license or have otherwise acquired intellectual property rights or technology, which could result in the loss of rights or technology that are material to our business.

We are party to various agreements that we depend on to operate our business. Our rights to use currently licensed intellectual property, or intellectual property to be licensed in the future, are or will be subject to the continuation of and our compliance with the terms of these agreements. These agreements are complex, and certain provisions in such agreements may be susceptible to multiple interpretations which could lead to disputes, including but not limited to those regarding:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- the extent to which our proprietary technology and product candidates infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- the sublicensing of patent and other rights;
- diligence obligations under the license agreement and what activities satisfy those diligence obligations;
- the ownership of inventions and know-how resulting from the creation or use of intellectual property by us or our counterparties, alone or jointly;
- the scope and duration of our payment obligations;
- rights upon termination of such agreement; and
- the scope and duration of exclusivity obligations of each party to the agreement.

The resolution of any contractual interpretation dispute that may arise, if unfavorable to us, could seriously harm our business. Such resolution could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, increase what we believe to be our financial or other obligations under the relevant agreement, or decrease the third party's financial or other obligations under the relevant agreement.

If disputes over intellectual property rights that we have licensed or acquired from third parties prevent or impair our ability to maintain our current license agreements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates. If we fail to comply with our obligations under current or future license agreements, these agreements may be terminated or the scope of our rights under them may be reduced and we might be unable to develop, manufacture or market any product that is licensed under these agreements.

Litigation or other proceedings or third-party claims of intellectual property infringement could require us to spend significant time and money and could prevent us from selling our products.

Our commercial success depends significantly on our ability to operate without infringing the patents and other proprietary rights of third parties. However, our research, development and commercialization activities may be subject to claims that we infringe or otherwise violate patents or other intellectual property rights owned or controlled by third parties. Claims by third parties that we infringe their proprietary rights may result in liability for damages or prevent or delay our developmental and commercialization efforts. We cannot assure you that our operations do not, or will not in the future, infringe existing or future patents or other proprietary rights of third parties.

Third parties may have or obtain patents or other proprietary rights that could limit our ability to make, use, sell, offer for sale or import our product candidates and future approved products, if any, or impair our competitive position. There is a substantial amount of litigation, both within and outside the

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United States, involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries, including patent infringement lawsuits, interferences, oppositions, reexaminations, *inter partes* review proceedings and post-grant review proceedings before the USPTO and/or corresponding foreign patent offices. Numerous third-party U.S. and foreign issued patents and pending patent applications exist in the fields in which we are developing product candidates. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates.

Furthermore, the scope of a patent claim is determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history and can involve other factors such as expert opinion. Our interpretation of the relevance or the scope of claims in a patent or a pending application may be incorrect, which may negatively impact our ability to market our products. Further, we may incorrectly determine that our technologies or product candidates are not covered by a third-party patent or may incorrectly predict whether a third party's pending patent application will issue with claims of relevant scope. Our determination of the expiration date of any patent in the United States or abroad that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our product candidates.

As the biotechnology industry expands and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the patent rights of third parties. Our competitors in both the United States and abroad, many of which have substantially greater resources and have made substantial investments in patent portfolios and competing technologies, may have applied for or obtained or may in the future apply for and obtain, patents that will prevent, limit or otherwise interfere with our ability to make, use and sell our product candidates. We do not always conduct independent reviews of pending patent applications of and patents issued to third parties. Patent applications in the United States and elsewhere are typically published approximately 18 months after the earliest filing for which priority is claimed, with such earliest filing date being commonly referred to as the priority date. Certain U.S. applications that will not be filed outside the United States can remain confidential until patents issue. In addition, patent applications in the United States and elsewhere can be pending for many years before issuance, or unintentionally abandoned patents or applications can be revived. Furthermore, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our technologies, our product candidates or the use of our product candidates. As such, there may be applications of others now pending or recently revived patents of which we are unaware. These applications may later result in issued patents, or the revival of previously abandoned patents, that will prevent, limit or otherwise interfere with our ability to make, use or sell our product candidates. As a result, we may be unaware of third-party patents that may be infringed by commercialization of our product candidates, and cannot be certain that we were the first to file a patent application related to a product candidate or technology. Moreover, because patent applications can take many years to issue, there may be currently pending patent applications that may later result in issued patents that our product candidates may infringe. In addition, identification of third-party patent rights that may be relevant to our technology is difficult because patent searching is imperfect due to differences in terminology among patents, incomplete databases and the difficulty in assessing the meaning of patent claims. Any claims of patent infringement asserted by third parties would be time consuming and could:

- result in costly litigation;
- divert the time and attention of our technical personnel and management;
- cause development delays;
- prevent us from commercializing our product candidates until the asserted patent expires or is held finally invalid or not infringed in a court of law;

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- require us to develop non-infringing technology, which may not be possible on a cost-effective basis;
- require us to pay damages to the party whose intellectual property rights we may be found to be infringing, which may include treble damages if we are found to have been willfully infringing such intellectual property;
- require us to pay the attorney's fees and costs of litigation to the party whose intellectual property rights we may be found to be infringing; and/or
- require us to enter into royalty or licensing agreements, which may not be available on commercially reasonable terms, or at all.

Although no third party has asserted a claim of patent infringement against us as of the date of this prospectus, others may hold proprietary rights that could prevent our product candidates or any future products from being marketed. Any patent-related legal action against us claiming damages and seeking to enjoin commercial activities relating to our product candidates or proprietary technologies could subject us to potential liability for damages, including treble damages if we were determined to willfully infringe, and require us to obtain a license to manufacture or market our product candidates or any future products. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be time-consuming and a substantial diversion of management and employee resources from our business. We cannot predict whether we would prevail in any such actions or that any license required under any of these patents would be made available on commercially acceptable terms, if at all. Even if such licenses are available, we could incur substantial costs related to royalty payments for licenses obtained from third parties, which could negatively affect our gross margins, and the rights may be non-exclusive, which could give our competitors access to the same technology or intellectual property rights licensed to us. In addition, we cannot be certain that we could redesign our product candidates or proprietary technologies to avoid infringement, if necessary, or on a cost-effective basis. Accordingly, an adverse determination in a judicial or administrative proceeding, or the failure to obtain necessary licenses, could prevent us from developing and commercializing our product candidates or any future products which could seriously harm our business. In addition, intellectual property litigation, regardless of its outcome, may cause negative publicity and could prohibit us from marketing or otherwise commercializing our product candidates and technology.

If we collaborate with third parties in the development of technology in the future, our collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our intellectual property or proprietary information or expose us to litigation or potential liability. Further, collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability. Also, we may be obligated under our agreements with our collaborators, licensors, suppliers and others to indemnify and hold them harmless for damages arising from intellectual property infringement by us.

We may be involved in lawsuits to protect or enforce our patents or the patents of our licensors, which could be expensive, time consuming, and unsuccessful. Further, our issued patents could be found invalid or unenforceable if challenged.

Competitors may infringe our intellectual property rights or those of our licensors. To prevent infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in a patent infringement proceeding, a court or administrative tribunal may decide that a patent we own or license is not valid, is unenforceable and/or is not infringed. If we or any of our potential future collaborators were to initiate legal proceedings

against a third party to enforce a patent directed at one of our product candidates, the defendant could counterclaim that our patent is invalid and/or unenforceable in whole or in part. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge include an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could include an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO or made a misleading statement during prosecution. Third parties may also raise similar claims before the USPTO, even outside the context of litigation. Similar mechanisms for challenging the validity and enforceability of a patent exist in foreign patent offices and may result in the revocation, cancellation, or amendment of any foreign patents we hold in the future. The outcome following legal assertions of invalidity and unenforceability is unpredictable, and prior art could render our patents or those of our licensors invalid. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we could lose at least part, and perhaps all, of the patent protection on an affected product candidate. Such a loss of patent protection would seriously harm our business.

Interference or derivation proceedings provoked by third parties or brought by us or declared by the USPTO, or equivalent actions brought in foreign jurisdictions, may be necessary to determine the priority of inventions with respect to our patents or patent applications or those of our licensors. An unfavorable outcome could require us to cease using the related technology or to attempt to license rights to it from the prevailing party. Our business could be seriously harmed if the prevailing party does not offer us a license on commercially reasonable terms or at all, or if a non-exclusive license is offered and our competitors gain access to the same technology. Our defense of litigation or interference proceedings may fail and, even if successful, may result in substantial costs and distract our management and other employees. In addition, the uncertainties associated with litigation could have a material adverse effect on our ability to raise the funds necessary to continue our clinical trials, continue our research programs, license necessary technology from third parties or enter into development or manufacturing partnerships that would help us bring our product candidates to market.

Even if resolved in our favor, litigation or other legal proceedings relating to our intellectual property rights may cause us to incur significant expenses, and could distract our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. We may not have sufficient financial or other resources to conduct such litigation or proceedings adequately. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could compromise our ability to compete in the marketplace and seriously harm our business.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

We may not be successful in obtaining or maintaining necessary rights to our product candidates through acquisitions and licenses.

We currently have rights to the intellectual property, through licenses from third parties and under patents that we own, to develop our product candidates. Because our programs may require the use of proprietary rights held by third parties, the growth of our business will depend in part on our ability to acquire, license or use these proprietary rights. We may be unable to acquire or license any compositions, methods of use, processes or other third-party intellectual property rights from third parties that we identify as necessary for our product candidates. The licensing and acquisition of third-party intellectual property rights is a competitive area, and a number of more established companies are also pursuing strategies to license or acquire third-party intellectual property rights that we may consider attractive. These established companies may have a competitive advantage over us due to their size, cash resources and greater clinical development and commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. We also may be unable to license or acquire third-party intellectual property rights on terms that would allow us to make an appropriate return on our investment.

We have collaborated with, and are currently collaborating with, U.S. academic institutions and may in the future collaborate with U.S. and foreign academic institutions to accelerate our preclinical research or development under written agreements with these institutions. These institutions may provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the collaboration. Regardless of such option, we may be unable to negotiate a license within the specified timeframe or under terms that are acceptable to us. If we are unable to do so, the institution may offer the intellectual property rights to other parties, potentially blocking our ability to pursue our program.

If we are unable to successfully obtain rights to required third-party intellectual property rights or maintain the existing intellectual property rights we have, we may have to abandon development of that program and our business could be seriously harmed.

We may be subject to claims that we have wrongfully hired an employee from a competitor or that we, our employees or consultants have wrongfully used or disclosed alleged confidential information or trade secrets of their former or concurrent employers or former or current clients.

As is common in the biotechnology and biopharmaceutical industries, in addition to our employees, we engage the services of consultants to assist us in the development of our product candidates. Many of these consultants, and many of our employees, were previously employed at, or may have previously provided or may be currently providing consulting services to, other biotechnology or biopharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees and consultants do not use the proprietary information or know-how of others in their work for us, we may become subject to claims that we, our employees or a consultant inadvertently or otherwise used or disclosed trade secrets or other information proprietary to their former employers or their former or current clients. We may also be subject to claims that patents and applications we have filed to protect inventions of our employees or consultants, even those related to one or more of our product candidates, are rightfully owned by their former or concurrent employer or former or current client. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, which could seriously harm our business. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to our management and other employees.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

Our agreements with employees and consultants provide that any inventions conceived by an individual in the course of rendering services to us shall be our exclusive property. Although our policy is to have all such individuals complete these agreements, we may not obtain these agreements in all circumstances, and individuals with whom we have these agreements may not comply with their terms. The assignment of intellectual property may not be self-executing and despite such agreement, such inventions may become assigned to third parties. In the event of unauthorized use or disclosure of our trade secrets or proprietary information, these agreements, even if obtained, may not provide meaningful protection, particularly for our trade secrets or other confidential information. We may also be subject to claims that former employees, consultants, or other third parties have an ownership interest in our patents or other intellectual property. In addition, we may face claims by third parties that our agreements with employees or consultants obligating them to assign intellectual property to us are ineffective or in conflict with prior or competing contractual obligations of assignment, which could result in ownership disputes regarding intellectual property we have developed or will develop and interfere with our ability to capture the commercial value of such intellectual property. Litigation may be necessary to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights. Such an outcome could seriously harm our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and distraction to our management and other employees.

If we do not obtain patent term extension for our product candidates, our business may be seriously harmed.

Depending upon the timing, duration and specifics of FDA marketing approval of any of our product candidates, one or more of our U.S. patents may be eligible for limited patent term restoration under the Drug Price Competition and Patent Term Restoration Act of 1984, also known as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. The Hatch-Waxman Act allows a maximum of one patent to be extended per FDA approved product as compensation for the patent term lost during the FDA regulatory review process. A patent term extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval and only those claims covering such approved drug product, a method for using it or a method for manufacturing it may be extended. Patent term extension may also be available in certain foreign countries upon regulatory approval of our product candidates. However, we may not be granted an extension because of, for example, failing to apply within applicable deadlines, failing to apply prior to expiration of relevant patents or otherwise failing to satisfy applicable requirements. Moreover, the applicable time period or the scope of patent protection afforded could be less than we request. If we are unable to obtain patent term extension or restoration or the term of any such extension is less than we request, our competitors may obtain approval of competing products following our patent expiration of the applicable product, and our business may be seriously harmed.

Changes in patent law in the United States or in other countries could diminish the value of patents in general, thereby impairing our ability to protect our product candidates.

Our patent rights may be affected by developments or uncertainty in the U.S. or foreign patent statutes, patent case laws, USPTO rules and regulations or in the rules and regulations of foreign patent offices.

There are a number of recent changes to the U.S. patent laws that may have a significant impact on our ability to protect our technology and enforce our intellectual property rights. For example, on

September 16, 2011, the Leahy-Smith America Invents Act (Leahy-Smith Act) was signed into law. The Leahy-Smith Act includes a number of significant changes to the U.S. patent law. These include provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. In particular, under the Leahy-Smith Act, the United States transitioned in March 2013 to a “first to file” system in which the first inventor to file a patent application will be entitled to the patent. Third parties are allowed to submit prior art before the issuance of a patent by the USPTO, and may become involved in post-grant proceedings including opposition, derivation, reexamination, *inter partes* review or interference proceedings challenging our patent rights or the patent rights of others. An adverse determination in any such submission, proceeding or litigation could reduce the scope or enforceability of, or invalidate, our patent rights, which could adversely affect our competitive position. This could have a negative impact on some of our intellectual property and could increase uncertainties surrounding obtaining and enforcement or defense of our issued patents. In addition, Congress may pass patent reform legislation that is unfavorable to us. The Supreme Court has ruled on several patent cases in recent years, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by Congress, the federal courts and the USPTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents we might obtain in the future. Similarly, statutory or judicial changes to the patent laws of other countries may increase the uncertainties and costs surrounding the prosecution of patent applications and the enforcement or defense of issued patents. Complying with these laws and regulations could limit our ability to obtain new patents in the future that may be important for our business.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending all current and future patents in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection but enforcement is not as strong as that in the United States. These products may compete with our product candidates, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

The legal systems of many foreign countries do not favor the enforcement of patents and other intellectual property protection, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights. For example, some foreign countries have compulsory licensing laws under which a patent owner must grant licenses to third parties. In addition, some countries limit the enforceability of patents against third parties, including government agencies or government contractors. In these countries, patents may provide limited or no benefit. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be

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inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license. If we or any of our licensors is forced to grant a license to third parties with respect to any patents relevant to our business, our business may be seriously harmed.

Obtaining and maintaining patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other provisions during the patent process. Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or applications will be due to be paid to the USPTO and various governmental patent agencies outside of the United States in several stages over the lifetime of the patents and/or applications. We employ reputable professionals and rely on such third parties to help us comply with these requirements and effect payment of these fees with respect to the patents and patent applications that we own, and if we license intellectual property we may have to rely upon our licensors to comply with these requirements and effect payment of these fees with respect to any patents and patent applications that we license. In many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which noncompliance can result in abandonment or lapse of a patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, competitors might be able to enter the market earlier than would otherwise have been the case.

We have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

We cannot specify with certainty the uses of the majority of the net proceeds we will receive from this offering. Our management will have broad discretion in the application of the net proceeds, including for any of the purposes described in the section of this prospectus titled "Use of Proceeds." Our management may spend a portion or all of the net proceeds from this offering in ways that our stockholders may not desire or that may not yield a favorable return. The failure by our management to apply these funds effectively could seriously harm our business. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value.

Participation in this offering by our existing stockholders and/or their affiliated entities may reduce the public float for our common stock.

To the extent certain of our existing stockholders and their affiliated entities participate in this offering, such purchases would reduce the non-affiliate public float of our shares, meaning the number of shares of our common stock that are not held by officers, directors and controlling stockholders. A reduction in the public float could reduce the number of shares that are available to be traded at any given time, thereby adversely impacting the liquidity of our common stock and depressing the price at which you may be able to sell shares of common stock purchased in this offering.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains forward-looking statements concerning our business, operations and financial performance and condition, as well as our plans, objectives and expectations for our business operations and financial performance and condition. Any statements contained herein that are not statements of historical facts may be deemed to be forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as “aim,” “anticipate,” “assume,” “believe,” “contemplate,” “continue,” “could,” “due,” “estimate,” “expect,” “goal,” “intend,” “may,” “objective,” “plan,” “predict,” “potential,” “positioned,” “seek,” “should,” “target,” “will,” “would” and other similar expressions that are predictions of or indicate future events and future trends, or the negative of these terms or other comparable terminology. These forward-looking statements include, but are not limited to, statements about:

- the success, cost and timing of our development activities, preclinical studies and clinical trials, including our clinical trials for 4D-310, 4D-125 and 4D-110;
- the timing of IND-enabling studies and results from such studies, including our IND-enabling studies in 4D-150 and 4D-710;
- the timing and success of lead optimization for our product candidates in lead optimization, including for 4D-135;
- the translation of our preclinical results and data into future clinical trials in humans;
- the timing of any manufacturing runs for materials to be used in patient trials;
- the number, size and design of our planned clinical trials, and what regulatory authorities may require to obtain marketing approval
- the potential effects of the COVID-19 pandemic on our preclinical and clinical programs and business;
- the timing or likelihood of regulatory filings and approvals;
- our ability to obtain and maintain regulatory approval of our product candidates, and any related restrictions, limitations and/or warnings in the label of any approved product candidate;
- our ability to obtain funding for our operations, including funding necessary to develop and commercialize our product candidates;
- the rate and degree of market acceptance of our product candidates;
- the success of competing products or platform technologies that are or may become available;
- our plans and ability to establish sales, marketing and distribution infrastructure to commercialize any product candidates for which we obtain approval;
- future agreements with third parties in connection with the commercialization of our product candidates;
- the size and growth potential of the markets for our product candidates, if approved for commercial use, and our ability to serve those markets;
- existing regulations and regulatory developments in the United States and foreign countries;
- the expected potential benefits of strategic collaboration agreements, including our relationships with Roche and uniQure, and our ability to attract collaborators with development, regulatory and commercialization expertise;
- the scope of protection we are able to establish and maintain for intellectual property rights covering our product candidates and technology;

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- potential claims relating to our intellectual property and third-party intellectual property;
- our ability to contract with third-party suppliers and manufacturers and their ability to perform adequately;
- the pricing and reimbursement of our product candidates, if approved;
- our ability to attract and retain key managerial, scientific and medical personnel;
- the accuracy of our estimates regarding expenses, future revenue, capital requirements and needs for additional financing;
- our financial performance;
- our expectations regarding the period during which we qualify as an emerging growth company under the JOBS Act;
- our anticipated use of the proceeds from this offering; and
- other risks and uncertainties, including those listed under the section titled “Risk Factors.”

These forward-looking statements are based on management’s current expectations, estimates, forecasts and projections about our business and the industry in which we operate and management’s beliefs and assumptions and are not guarantees of future performance or development and involve known and unknown risks, uncertainties and other factors that are in some cases beyond our control. As a result, any or all of our forward-looking statements in this prospectus may turn out to be inaccurate. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed under the section titled “Risk Factors” and elsewhere in this prospectus. Potential investors are urged to consider these factors carefully in evaluating the forward-looking statements. These forward-looking statements speak only as of the date of this prospectus. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future. You should, however, review the factors and risks we describe in the reports we will file from time to time with the SEC after the date of this prospectus. See the section titled “Where You Can Find More Information.”

INDUSTRY AND MARKET DATA

This prospectus contains estimates, projections and other information concerning our industry, our business, and the markets for our product candidates, including data regarding the estimated patient population and market size for our product candidates, as well as data regarding market research, estimates and forecasts prepared by our management. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties, and actual events or circumstances may differ materially from events and circumstances that are assumed in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources. In some cases, we do not expressly refer to the sources from which this data is derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph is derived from the same sources, unless otherwise expressly stated or the context otherwise requires.

USE OF PROCEEDS

We estimate that the net proceeds from the issuance and sale of 4,761,904 shares of our common stock in this offering will be approximately \$89.9 million, or approximately \$103.9 million if the underwriters exercise their option to purchase additional shares in full, based on the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

Each \$1.00 increase or decrease in the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, the net proceeds to us from this offering by approximately \$4.4 million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting underwriting discounts and commissions. We may also increase or decrease the number of shares we are offering. Each increase or decrease of 1.0 million shares in the number of shares we are offering would increase or decrease, as applicable, the net proceeds to us from this offering, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, by approximately \$19.5 million, assuming the assumed initial public offering price stays the same. We do not expect that a change in the initial price to the public or the number of shares by these amounts would have a material effect on the uses of the proceeds from this offering, although it may accelerate the time at which we will need to seek additional capital. The pro forma as adjusted information is illustrative only, and we will adjust this information based on the actual initial public offering price and other terms of this offering determined at pricing.

The principal purposes of this offering are to obtain additional capital to support our operations, to create a public market for our common stock and to facilitate our future access to the public equity markets. We currently intend to use the net proceeds from this offering, together with our existing cash and cash equivalents, as follows:

- \$65.0 million to \$70.0 million to fund our ongoing and planned clinical and preclinical development of our product candidates, including ongoing clinical trials for 4D-310 and 4D-125 and IND-enabling study activities for 4D-150 and 4D-710;
- \$30.0 million to \$35.0 million to fund the further development and expansion of our pipeline including to complete lead optimization and IND-enabling studies for 4D-135, and potentially other research candidates;
- \$5.0 million to \$10.0 million to fund the continued expansion of our manufacturing capabilities and facilities; and
- any remaining amounts for working capital and other general corporate purposes.

Based on our current operating plan, we estimate that our current cash and cash equivalents, together with the anticipated net proceeds from this offering, will be sufficient to fund our operating expenses and capital expenditure requirements at least into the fourth quarter of 2022. In particular, we expect that these capital resources will be sufficient to fund:

- our ongoing Phase 1/2 clinical trial for 4D-125 through our anticipated initial clinical data in 2021, our ongoing Phase 1 clinical trial for 4D-110 through our anticipated initial clinical data in 2022 and our ongoing Phase 1/2 clinical trial for 4D-310 through our anticipated initial clinical data in 2021; and
- our ongoing IND-enabling study activities for 4D-150 and 4D-710 through our anticipated IND submission and Phase 1/2 clinical trial initiation for each of these product candidates in the second half of 2021.

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The amounts and timing of our actual expenditures and the extent of our research and development activities may vary significantly depending on numerous factors, including the progress of our development efforts, the status of and results from any preclinical or clinical trials we may commence in the future, our ability to take advantage of expedited programs or to obtain regulatory approval for any other product candidates we may identify and pursue, the timing and costs associated with the manufacture and supply of any other product candidates we may identify and pursue for clinical development or commercialization, and any unforeseen cash needs. As a result, our management will retain broad discretion over the allocation of the net proceeds from this offering.

We may also use a portion of the remaining net proceeds and our existing cash and cash equivalents to in-license, acquire, or invest in complementary businesses, technologies, products or assets. However, we have no current commitments or obligations to do so.

This expected use of the net proceeds from this offering represents our intentions based upon our current plans and business conditions. As of the date of this prospectus, we cannot predict with certainty all of the particular uses for the net proceeds to be received upon the completion of this offering or the amounts that we will actually spend on the uses set forth above. If we receive any additional proceeds from this offering, we expect to use such proceeds on a proportional basis to the categories described above (other than funding for manufacturing capabilities and facilities).

Pending their use, we intend to invest the net proceeds of this offering in a variety of capital-preservation investments, including short and intermediate-term, interest-bearing, investment-grade securities, and government securities.

DIVIDEND POLICY

We have never declared or paid cash dividends on our capital stock. We currently intend to retain all available funds and any future earnings, if any, to fund the development and expansion of our business, and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to dividend policy will be made at the discretion of our board of directors.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and capitalization as of September 30, 2020:

- on an actual basis;
- on a pro forma basis to give effect to: (i) the automatic conversion of 11,575,984 shares of our outstanding redeemable convertible preferred stock as of September 30, 2020 into an equivalent number of shares of our common stock immediately prior to the completion of this offering, and (ii) the filing and effectiveness of our amended and restated certificate of incorporation, which will occur, in each case, immediately prior to the completion of this offering; and
- on a pro forma as adjusted basis to give further effect to sale and issuance of 4,761,904 shares of our common stock in this offering, assuming an initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

You should read this information together with our financial statements and related notes included elsewhere in this prospectus and the information set forth in the sections titled “Selected Financial Data” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

	As of September 30, 2020		
	Actual	Pro Forma	Pro Forma As Adjusted ⁽¹⁾
	(in thousands, except share and per share amounts)		
Cash and cash equivalents	\$ 88,755	\$ 88,755	\$ 178,675
Redeemable convertible preferred stock, \$0.0001 par value: 11,575,984 shares authorized and 11,575,984 issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma or pro forma as adjusted	\$ 175,448	\$ —	\$ —
Stockholders’ (deficit) equity:			
Preferred stock, \$0.0001 per value: no shares authorized, issued and outstanding, actual; 10,000,000 authorized and no shares issued or outstanding, pro forma and pro forma as adjusted	—	—	—
Common stock, \$0.0001 par value: 20,866,244 shares authorized; 5,257,742 shares issued and outstanding, actual; 300,000,000 shares authorized, pro forma and pro forma as adjusted; 16,833,726 shares issued and outstanding, pro forma; 21,595,630 shares issued and outstanding, pro forma as adjusted	1	2	2
Additional paid-in capital	9,839	185,286	275,186
Accumulated deficit	(115,132)	(115,132)	(115,132)
Total stockholders’ (deficit) equity	(105,292)	70,156	160,056
Total capitalization	\$ 70,156	\$ 70,156	\$ 160,056

- (1) Each \$1.00 increase or decrease in the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, each of the amount of our cash and cash equivalents, additional paid-in capital, total stockholders’ (deficit) equity and total capitalization by \$4.4 million,

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assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. Each increase or decrease of 1.0 million in the number of shares offered by us would increase or decrease, as applicable, each of the amount of our cash and cash equivalents, additional paid-in capital, total stockholders' (deficit) equity and total capitalization by \$19.5 million, assuming the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. The pro forma as adjusted information discussed above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering determined at pricing.

The number of shares of our common stock issued and outstanding pro forma and pro forma adjusted in the table above is based on 16,833,726 shares of our common stock (including our redeemable convertible preferred stock on an as-converted basis) outstanding as of September 30, 2020, and excludes:

- 2,928,321 shares of our common stock issuable upon the exercise of stock options to purchase common stock that were outstanding as of September 30, 2020, with a weighted-average exercise price of \$9.11 per share;
- 68,669 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted-average exercise price of \$1.85 per share;
- 499,000 shares of our common stock issuable upon the exercise of stock options to purchase common stock that were granted after September 30, 2020, each with an exercise price of \$18.66 per share;
- 30,000 shares of our common stock issuable upon the exercise of a warrant to purchase common stock that was issued after September 30, 2020, with an exercise price of \$18.00 per share;
- 41,897 shares of our common stock reserved for issuance pursuant to future awards under our 2015 Equity Incentive Plan (the Plan) and associated amendments as of September 30, 2020;
- 2,315,498 shares of our common stock reserved for issuance pursuant to future awards under our 2020 Equity Incentive Award Plan (the 2020 Plan), as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the completion of this offering; and
- 215,956 shares of our common stock reserved for issuance pursuant to future awards under our 2020 Employee Stock Purchase Plan (the ESPP), as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the completion of this offering.

DILUTION

If you invest in our common stock in this offering, your interest will be immediately diluted to the extent of the difference between the initial public offering price per share of our common stock in this offering and the pro forma as adjusted net tangible book value per share of our common stock immediately after the completion of this offering.

As of September 30, 2020, our historical net tangible book value (deficit) was \$(105.4) million, or \$(20.04) per share of our common stock. Our historical net tangible book value (deficit) per share represents total tangible assets less total liabilities and redeemable convertible preferred stock divided by the number of shares of our common stock outstanding on September 30, 2020.

Our pro forma net tangible book value as of September 30, 2020, before giving effect to this offering, was \$70.1 million, or \$4.16 per share of our common stock. Pro forma net tangible book value represents our historical net tangible book value (deficit), before the issuance and sale of shares in this offering, and gives effect to the automatic conversion of 11,575,984 shares of our outstanding redeemable convertible preferred stock as of September 30, 2020 into an equivalent number of shares of our common stock immediately prior to the completion of this offering.

Our pro forma as adjusted net tangible book value represents our pro forma net tangible book value, plus the effect of the sale of 4,761,904 shares of our common stock in this offering at an assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. We determine dilution per share to investors participating in this offering by subtracting pro forma as adjusted net tangible book value per share after this offering from the assumed initial public offering price per share paid by investors participating in this offering.

The following table illustrates this per share dilution:

Assumed initial public offering price per share		\$21.00
Historical net tangible book value (deficit) per share as of September 30, 2020	\$(20.04)	
Pro forma increase in historical net tangible book value (deficit) per share	<u>24.20</u>	
Pro forma net tangible book value per share as of September 30, 2020	4.16	
Increase in pro forma net tangible book value per share attributable to new investors	<u>3.25</u>	
Pro forma as adjusted net tangible book value per share		<u>7.41</u>
Dilution per share to new investors participating in this offering		<u>\$13.59</u>

Each \$1.00 increase or decrease in the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, our pro forma as adjusted net tangible book value as of September 30, 2020 after this offering by \$4.4 million, or \$0.21 per share, and would increase or decrease dilution to investors in this offering by \$0.79 per share, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. Each increase of 1.0 million shares in the number of shares we are offering would increase our pro forma as adjusted net tangible book value as of September 30, 2020 after this offering by \$19.5 million, or \$0.54 per share and would decrease dilution of investors in this offering by \$0.54 per share assuming the

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assumed initial public offering price per share remains the same, and after deducting the estimated underwriting discount and commissions and estimated offering expenses payable by us. Each decrease of 1.0 million shares in the number of shares we are offering would decrease our pro forma as adjusted net tangible book value as of September 30, 2020 after this offering by \$19.5 million, or \$0.59 per share and would increase dilution of investors in this offering by \$0.59 per share assuming the assumed initial public offering price per share remains the same, and after deducting the estimated underwriting discount and commissions and estimated offering expenses payable by us. The pro forma as adjusted information is illustrative only, and we will adjust this information based on the actual initial public offering price and other terms of this offering determined at pricing.

If the underwriters fully exercise their option to purchase additional shares, pro forma as adjusted net tangible book value after this offering would be \$7.80 per share, the increase in pro forma as adjusted net tangible book value per share to existing stockholders would be \$3.64 per share, and the decrease in dilution to investors in this offering would be \$0.39 per share.

To the extent that outstanding options with an exercise price per share that is less than the pro forma as adjusted net tangible book value per share are exercised, new investors will experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

The following table shows, as of September 30, 2020, on a pro forma as adjusted basis, the number of shares of our common stock purchased from us, the total consideration paid to us and the average price paid per share by existing stockholders and by new investors purchasing common stock in this offering, assuming an initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, before deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us (in thousands, except share and per share amounts and percentages):

	<u>Shares Purchased</u>		<u>Total Consideration</u>		<u>Weighted-Average Price Per Share</u>
	<u>Number</u>	<u>Percent</u>	<u>Amount</u>	<u>Percent</u>	
Existing stockholders	16,833,726	77.9%	\$184,967,743	64.9%	\$ 10.99
New investors participating in this offering	4,761,904	22.1	99,999,984	35.1	21.00
Total	<u>21,595,630</u>	<u>100%</u>	<u>\$284,967,727</u>	<u>100%</u>	\$ 13.20

If the underwriters were to fully exercise their option to purchase additional shares, the percentage of shares of our common stock held by existing investors would be 75.5%, and the percentage of shares of our common stock held by new investors would be 24.5%.

The foregoing tables and calculations (other than the historical net tangible book value calculation) are based on 16,833,726 shares of our common stock (including our redeemable convertible preferred stock on an as-converted basis) outstanding as of September 30, 2020, and excludes:

- 2,928,321 shares of our common stock issuable upon the exercise of stock options to purchase common stock that were outstanding as of September 30, 2020, with a weighted-average exercise price of \$9.11 per share;

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- 68,669 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted-average exercise price of \$1.85 per share;
- 499,000 shares of our common stock issuable upon the exercise of stock options to purchase common stock that were granted after September 30, 2020, each with an exercise price of \$18.66 per share;
- 30,000 shares of our common stock issuable upon the exercise of a warrant to purchase common stock that was issued after September 30, 2020, with an exercise price of \$18.00 per share;
- 41,897 shares of our common stock reserved for issuance pursuant to future awards under our 2015 Equity Incentive Plan (the Plan) and associated amendments as of September 30, 2020;
- 2,315,498 shares of our common stock reserved for issuance pursuant to future awards under our 2020 Equity Incentive Award Plan (the 2020 Plan), as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the completion of this offering; and
- 215,956 shares of our common stock reserved for issuance pursuant to future awards under our 2020 Employee Stock Purchase Plan (the ESPP), as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the completion of this offering.

To the extent that outstanding options or warrants are exercised, new options or other securities are issued under our equity incentive plans, or we issue additional shares of our common stock in the future, there will be further dilution to investors participating in this offering. In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

SELECTED FINANCIAL DATA

The following tables present our selected financial data for the periods and as of the dates indicated. We derived the selected statements of operations and comprehensive loss data for the years ended December 31, 2018 and 2019 and the selected balance sheet data as of December 31, 2018 and 2019 from our audited financial statements included elsewhere in this prospectus. We derived the selected statements of operations and comprehensive loss data for the nine months ended September 30, 2019 and 2020 and the selected balance sheet data as of September 30, 2020 from our unaudited interim financial statements that are included elsewhere in this prospectus. Our unaudited interim financial statements are prepared on the same basis as our audited financial statements and include, in the opinion of management, all adjustments, consisting of normal recurring adjustments, that are necessary for the fair statement of the financial information set forth in those financial statements. Our historical results are not necessarily indicative of the results that may be expected in the future and our historical results for the nine months ended September 30, 2020 are not necessarily indicative of the results that may be expected for the remainder of 2020. You should read this data together with our financial statements and related notes included elsewhere in this prospectus and the information under the section titled “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

	Year Ended December 31,		Nine Months Ended September 30,	
	2018	2019	2019	2020
(in thousands, except share and per share data)				
Statements of Operations and Comprehensive Loss Data:				
Revenue:				
Collaboration and license revenue	\$ 8,987	\$ 6,960	\$ 4,930	\$ 14,340
Collaboration and license revenue, related parties	5,143	26	26	249
Total revenue	<u>14,130</u>	<u>6,986</u>	<u>4,956</u>	<u>14,589</u>
Operating expenses:				
Research and development	18,362	38,718	26,359	40,433
Acquired in-process research and development	—	5,137	5,137	—
General and administrative	6,167	13,895	7,936	10,398
Total operating expenses	<u>24,529</u>	<u>57,750</u>	<u>39,432</u>	<u>50,831</u>
Loss from operations	(10,399)	(50,764)	(34,476)	(36,242)
Other income (expense)	848	1,458	1,285	96
Net loss and comprehensive loss	<u>\$ (9,551)</u>	<u>\$ (49,306)</u>	<u>\$ (33,191)</u>	<u>\$ (36,146)</u>
Net loss per share attributable to common stockholders, basic and diluted ⁽¹⁾	<u>\$ (1.89)</u>	<u>\$ (9.59)</u>	<u>\$ (6.46)</u>	<u>\$ (6.97)</u>
Weighted-average shares outstanding used in computing net loss per share attributable to common stockholders, basic and diluted ⁽¹⁾	<u>5,049,203</u>	<u>5,142,560</u>	<u>5,135,622</u>	<u>5,188,628</u>
Pro forma net loss per share, basic and diluted ⁽¹⁾		<u>\$ (3.94)</u>		<u>\$ (2.44)</u>
Weighted-average shares outstanding used in computing pro forma net loss per share, basic and diluted ⁽¹⁾		<u>12,518,191</u>		<u>14,835,343</u>

(1) See Notes 2 and 14 to our financial statements included elsewhere in this prospectus for an explanation of the calculations of our basic and diluted net loss per share attributable to common stockholders, pro forma net loss per share, and the weighted-average number of shares of our common stock used in the computation of the per share amounts.

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	As of December 31,		As of
	2018	2019	September 30, 2020
(in thousands)			
Balance Sheet Data:			
Cash and cash equivalents	\$ 91,761	\$ 49,652	\$ 88,755
Working capital(1)	86,014	39,553	78,258
Total assets	96,969	58,234	98,192
Accumulated deficit	(30,026)	(79,025)	(115,132)
Total stockholders' deficit	(27,587)	(72,970)	(105,292)

- (1) We define working capital as current assets less current liabilities. See our financial statements and related notes included elsewhere in this prospectus for further details regarding our current assets and current liabilities.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of our financial condition and results of operations together with our financial statements and related notes thereto included elsewhere in this prospectus. Some of the information contained in this discussion and analysis or set forth elsewhere in this prospectus, including information with respect to our plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the section titled "Risk Factors", our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis. All amounts are expressed in thousands other than share and per share amounts. Please also see the section of this prospectus titled "Special Note Regarding Forward-Looking Statements."

Overview

We are a clinical-stage gene therapy company pioneering the development of product candidates using our targeted and evolved AAV vectors. We seek to unlock the full potential of gene therapy using our platform, Therapeutic Vector Evolution, which combines the power of directed evolution with our approximately one billion synthetic capsid sequences to invent evolved vectors for use in targeted gene therapy products. Our targeted and evolved vectors are invented with the goal of being delivered through clinically routine, well-tolerated and minimally invasive routes of administration, of transducing diseased cells in target tissues efficiently, of having reduced immunogenicity and, where relevant, of having resistance to pre-existing antibodies. We believe these key design features will help us to potentially create targeted gene therapy product candidates with improved therapeutic profiles, and address a broad range of diseases from rare to large patient populations, including those that other gene therapies are unable to address. Each of our product candidates is created with our targeted and evolved AAV vectors. Our platform is designed to be modular, in that an evolved vector invented for a given set of diseases can be equipped with different transgene payloads to treat other diseases affecting the same tissue types. We believe this modularity will help inform the clinical development of subsequent product candidates using the same vector.

We have built a deep portfolio of gene therapy product candidates initially focused in three therapeutic areas: ophthalmology (intravitreal vector), cardiology (intravenous vector) and pulmonology (aerosol vector). We have three product candidates that are in clinical trials. We are developing 4D-125 for the treatment of X-linked retinitis pigmentosa (XLRP), currently in Phase 1/2 clinical trial with initial clinical data expected in 2021. We are advancing 4D-110 for the treatment of choroideremia, currently in a Phase 1 clinical trial with initial clinical data expected in 2022. Roche holds an exclusive worldwide license to 4D-110 and has the exclusive option to in-license 4D-125 prior to initiation of pivotal clinical trials. We received FDA Fast Track designation for 4D-310 for the treatment of Fabry disease, which is currently in a Phase 1/2 clinical trial, with initial clinical data expected in 2021. Our two IND candidates are 4D-150 for the treatment of wet age-related macular degeneration (wet AMD), and 4D-710 for the treatment of cystic fibrosis lung disease. We expect to file the IND and to initiate clinical trials for both of these programs in the second half of 2021.

From our inception in September 2013 through September 30, 2020, we have funded our operations primarily with an aggregate of \$175.4 million in net proceeds from the sale and issuance of redeemable convertible preferred stock and to a lesser extent from cash received pursuant to our collaboration and license agreements. As of September 30, 2020, we had cash and cash equivalents of \$88.8 million. Based on our current operating plan, we estimate that our cash and cash equivalents, together with the anticipated net proceeds from this offering, will be sufficient to fund our operating expenses and capital expenditure requirements at least into the fourth quarter of 2022. We have based this estimate

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on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect. See “Liquidity and Capital Resources.”

To date, we have devoted substantially all of our resources to building our Therapeutic Vector Evolution platform, developing manufacturing processes, assembling our core capabilities in drug development for genetic therapies and performing preclinical and clinical development of our product candidates.

We have incurred significant operating losses and expect that our operating losses will increase significantly as we, among other things, continue to advance our product candidates through preclinical and clinical development, seek regulatory approval, and prepare for, and, if approved, proceed to commercialization; broaden and improve our platform; acquire, discover, validate and develop additional product candidates; maintain, protect and enforce our intellectual property portfolio; and hire additional personnel. In addition, upon the completion of this offering we expect to incur additional costs associated with operating as a public company.

Our net losses were \$9.6 million, \$49.3 million, \$33.2 million and \$36.1 million for the years ended December 31, 2018 and 2019 and nine months ended September 30, 2019 and 2020, respectively. As of September 30, 2020, we had an accumulated deficit of \$115.1 million. We do not expect positive cash flows from operations in the foreseeable future. We expect to continue to incur significant and increasing net operating losses for at least the next several years as we:

- advance our product candidates through preclinical and clinical development;
- seek regulatory approval, prepare for and, if approved, proceed to commercialization of our product candidates;
- continue our research and development efforts and expand our pipeline of product candidates;
- attract, hire and retain additional personnel;
- maintain, expand and protect our intellectual property portfolio;
- operate as a public company;
- implement operational, financial and management information systems;
- establish a sales, marketing and distribution infrastructure to commercialize any product candidate for which we may obtain marketing approval; and
- invest in our manufacturing facility.

Our net losses may fluctuate significantly from quarter-to-quarter and year-to-year, depending on the timing of our clinical trials and our expenditures on other research and development activities.

We do not have any products approved for sale and have not generated any revenue from product sales since our inception. Our ability to generate product revenue will depend on the successful development, regulatory approval and eventual commercialization of one or more of our product candidates, if approved.

We will require substantial additional funding to support our continuing operations and further the development of our product candidates. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through the sale of equity, debt financings, or other capital sources, which could include income from collaborations, strategic partnerships or other strategic arrangements, for the foreseeable future. Adequate funding may not be available when needed or on terms acceptable to us, or at all. If we are unable to raise additional capital as needed,

we may have to significantly delay, scale back or discontinue development of our product candidates. Our ability to raise additional funds may be adversely impacted by potential worsening global economic conditions and the recent disruptions to, and volatility in, the credit and financial markets in the United States and worldwide resulting from the ongoing COVID-19 pandemic and otherwise. If we fail to obtain necessary capital when needed on acceptable terms, or at all, it could force us to delay, limit, reduce or terminate our product development programs, commercialization efforts or other operations. Insufficient liquidity may also require us to relinquish rights to product candidates at an earlier stage of development or on less favorable terms than we would otherwise choose. We cannot assure you that we will ever be profitable or generate positive cash flow from operating activities.

The global COVID-19 pandemic continues to rapidly evolve, and we will continue to monitor the COVID-19 situation closely. The extent of the impact of the COVID-19 pandemic on our business, operations and clinical development timelines and plans remains uncertain, and will depend on certain developments, including the duration and spread of the outbreak and its impact on our clinical trial enrollment, trial sites, CROs, third-party manufacturers, and other third parties with whom we do business, as well as its impact on regulatory authorities and our key scientific and management personnel. The ultimate impact of the COVID-19 pandemic or a similar health epidemic is highly uncertain and subject to change. To the extent possible, we are conducting business as usual, with necessary or advisable modifications to employee travel and the majority of our employees working remotely. We will continue to actively monitor the rapidly evolving situation related to the COVID-19 pandemic and may take further actions that alter our operations, including those that may be required by federal, state or local authorities, or that we determine are in the best interests of our employees and other third parties with whom we do business. At this point, the extent to which the COVID-19 pandemic may affect our business, operations and clinical development timelines and plans, including the resulting impact on our expenditures and capital needs, remains uncertain.

Components of Results of Operations

Revenue

Our revenue to date has been generated through payments from our collaboration and license agreements, primarily from upfront and milestone payments and expense reimbursement. We have not generated any revenue from the sale of approved products and do not expect to do so for the foreseeable future.

In 2019, we recognized \$7.0 million of revenue, principally from our agreements with Roche and AstraZeneca (previously MedImmune). For the nine months ended September 30, 2020, we recognized \$14.6 million of revenue, principally from our agreements with Roche and uniQure.

- We expect payments from Roche for reimbursement of our internal and third-party costs as well as the recognition of a \$21.0 million upfront payment received in 2017 and milestones received to date to be our principal drivers of revenue for the year ending December 31, 2020. Under our Collaboration and License Agreement with Roche, we are entitled to receive \$5.0 million upon the release of clinical trial material for our Phase 1 clinical trial for 4D-110 to treat choroideremia, and an additional \$5.0 million upon dosing our first patient in the trial. We achieved these milestones and received these payments in the second quarter and third quarter of 2020, respectively. If Roche continues the development of 4D-110, we will be entitled to further development and approval milestone payments, and, if the product candidate is approved, royalty payments in the mid-to high-single digits on net sales and sales-based milestones. Roche also has the option to assume the development and commercialization of 4D-125 to treat XLRP prior to pivotal trial initiation in return for an option payment and assumption of all future expenses. If Roche exercises this option, we would be entitled to future milestone payments upon development of 4D-125 and, if approved, royalty payments ranging from the mid-single digits to the mid-teens on future net sales and sales-based milestones.

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- In August 2019, we amended our agreement with uniQure to primarily eliminate the exclusivity clause that required us to work exclusively with uniQure on treatments for the central nervous system and liver and entered into a separate new collaboration and license agreement granting uniQure an exclusive license to a certain number of new AAV capsid variants that affect certain central nervous system and liver targets selected by uniQure. Neither party was required to pay monetary consideration in connection with the amendment or new agreement. We determined the incremental transaction price of the amendment and new agreement to be \$5.1 million and recorded the amount as deferred revenue. We began recognizing revenue related to this in 2020 and expect to recognize revenue over the next three to four years. See Note 6 to our financial statements included elsewhere in this prospectus for further discussion regarding the accounting treatment of this transaction.
- In June 2019, the research phase of our agreement with AstraZeneca concluded, and we delivered our final report to AstraZeneca. AstraZeneca's option to obtain the license of up to three project vector variants identified in the final report expired unexercised in the second quarter of 2020. We do not expect to recognize any revenue from AstraZeneca in 2020.

Future collaboration and license revenue is highly dependent on the successful development and commercialization of products by our collaboration partners, which is uncertain, and revenue may fluctuate significantly from period to period. Additionally, we may never receive the consideration from our license agreements that is contemplated for option fees, development and sales-based milestone payments or royalties on sales of licensed products, given the contingent nature of these payments. We expect that our license revenue in 2020 will be primarily from Roche. If our agreement with Roche were terminated, it may materially impact the amount of license revenue we recognize in future periods.

Operating Expenses

Our operating expenses consist of research and development and general and administrative expenses. Personnel costs including salaries, benefits, bonuses and stock-based compensation expense, comprise a significant component of research and development and general and administrative expenses. We allocate indirect expenses associated with our facilities, information technology costs, depreciation and other overhead costs between research and development and general and administrative categories based on employee headcount and the nature of work performed by each employee.

Research and Development

Our research and development expenses primarily consist of costs incurred for the discovery and preclinical and clinical development of our product candidates, which include:

- salaries and personnel-related costs, including benefits, stock-based compensation and travel, for our scientific personnel performing research and development activities;
- costs related to executing preclinical studies and clinical trials, including payments to CROs;
- costs related to acquiring, developing and manufacturing materials for preclinical studies and clinical trials including payments to CMOs;
- costs related to obtaining technology licenses for in-process research;
- costs related to laboratory supplies, research materials and other costs related to development and characterization of new AAV vectors and new product candidates;
- fees paid to consultants and other third parties who support our product candidate development, including CROs, CMOs and other service providers;

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- other costs in seeking regulatory approval of our product candidates; and
- allocated facility-related costs, information technology costs, depreciation expense and other overhead.

We expense all research and development costs in the periods in which they are incurred. We have entered into various agreements with CROs and CMOs. Costs of certain activities are recognized based on an evaluation of the progress to completion of specific tasks. Payments made prior to the receipt of goods or services that will be used or rendered for future research and development activities are deferred and capitalized as prepaid expenses and other current assets on our balance sheet. The capitalized amounts are recognized as expense as the goods are delivered or the related services are performed.

We do not allocate our costs by product candidate, as a significant amount of research and development expenses includes internal costs, such as payroll and other personnel expenses, laboratory supplies and allocated overhead, and external costs, such as fees paid to third parties to conduct research and development activities on our behalf, none of which are tracked by product candidate. In particular, with respect to internal costs, several of our departments support multiple product candidate research and development programs, and therefore the costs cannot be allocated to a particular product candidate or development program.

At this time, we cannot reasonably estimate or know the nature, timing or estimated costs of the efforts that will be necessary to complete the development of, and obtain regulatory approval for, any of our product candidates. We expect our research and development expenses to increase substantially for the foreseeable future as we continue to invest in research and development activities related to developing our product candidates, as our product candidates advance into later stages of development, as we begin to conduct larger clinical trials, as we seek regulatory approvals for any product candidates that successfully complete clinical trials, and incur expenses associated with hiring additional personnel to support our research and development efforts. The process of conducting the necessary clinical research to obtain regulatory approval is costly and time-consuming, and the successful development of our product candidates is highly uncertain. Our research and development expenses may vary significantly based on factors such as:

- the number and scope of preclinical and IND-enabling studies;
- the phases of development of our product candidates;
- the progress and results of our research and development activities;
- the number of trials required for regulatory approval;
- the length of time required to enroll eligible subjects and initiate clinical trials;
- the number of subjects that participate in the trials;
- potential additional safety monitoring requested by regulatory agencies;
- the duration of subject participation in the trials and follow-up;
- the cost and timing of manufacturing of our product candidates;
- the receipt of regulatory approvals from applicable regulatory authorities;
- the timing, receipt and terms of any marketing approvals from applicable regulatory authorities;
- the hiring and retention of research and development personnel;
- the degree to which we obtain, maintain, defend and enforce our intellectual property rights; and

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- the extent to which we establish collaborations, strategic partnerships or other strategic arrangements and the performance of any related third parties.

A change in the outcome of any of these variables with respect to the development of any of our product candidates could significantly change the costs and timing associated with the development of that product candidate.

General and Administrative

Our general and administrative expenses consist primarily of personnel-related expenses, including salaries, employee benefit costs and stock-based compensation expense, for our personnel in executive, finance and accounting, human resources, business development and other administrative functions. General and administrative expenses also include professional fees for legal, patent, consulting, accounting and tax services, allocated overhead, including rent, equipment, depreciation, information technology costs and utilities, and other general operating expenses not otherwise classified as research and development expenses.

We expect our general and administrative expenses to increase in the future as we increase our headcount to support our continued research activities and development of our programs. We also expect increased personnel-related costs, patent costs for our product candidates, consulting, legal and accounting services associated with maintaining compliance with stock exchange listing and requirements of the SEC, investor relations costs, director and officer insurance premiums and other costs associated with being a public company.

Other Income (Expense)

Our other income (expense) primarily consists of interest income earned on our cash equivalents and adjustments for the change in the fair value of our derivative liability which must be remeasured at each reporting period.

Results of Operations

Comparison of the Nine Months Ended September 30, 2019 and 2020

The following table summarizes our results of operations for the periods indicated (dollars in thousands):

	Nine Months Ended September 30,		\$ Change	% Change
	2019	2020		
Revenue:				
Collaboration and license revenue	\$ 4,930	\$ 14,340	\$ 9,410	191%
Collaboration and license revenue, related parties	26	249	223	858%
Total revenue	<u>4,956</u>	<u>14,589</u>	<u>9,633</u>	<u>194%</u>
Operating Expenses:				
Research and development	26,359	40,433	14,074	53%
Acquired in-process research and development	5,137	—	(5,137)	(100%)
General and administrative	7,936	10,398	2,462	31%
Total operating expenses	<u>39,432</u>	<u>50,831</u>	<u>11,399</u>	<u>29%</u>
Loss from operations	(34,476)	(36,242)	(1,766)	5%
Other Income (Expense)	<u>1,285</u>	<u>96</u>	<u>(1,189)</u>	<u>(93)%</u>
Net loss and comprehensive loss	<u><u>\$(33,191)</u></u>	<u><u>\$(36,146)</u></u>	<u><u>\$(2,955)</u></u>	<u><u>9%</u></u>

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Revenue

Revenue increased from \$5.0 million for the nine months ended September 30, 2019 to \$14.6 million for the nine months ended September 30, 2020. The increase of \$9.6 million, or 194%, was due to a \$9.8 million increase in revenue recognized under our Collaboration and License Agreement with Roche, which was partially offset by a decline in revenue recognized from other collaboration and license agreements.

Research and Development Expenses

The following table provides a breakout of research and development expenses for the periods indicated (dollars in thousands):

	Nine Months Ended September 30,		\$ Change	% Change
	2019	2020		
External expenses	\$14,257	\$23,253	\$ 8,996	63%
Payroll and personnel expenses	8,574	11,584	3,010	35%
Other research and development expenses	3,528	5,596	2,068	59%
Total research and development expenses	<u>\$26,359</u>	<u>\$40,433</u>	<u>\$14,074</u>	<u>53%</u>

Research and development expenses increased from \$26.4 million for the nine months ended September 30, 2019 to \$40.4 million for the nine months ended September 30, 2020. The increase of \$14.1 million, or 53%, was due to the following:

- a \$9.0 million increase in external costs as we continue to develop novel vectors and identify potential product candidates and progress our preclinical studies and clinical trials;
- a \$3.0 million increase in payroll and personnel expenses due to increased headcount of research and development personnel, including a \$0.4 million increase in employee stock-based compensation expense; and
- a \$2.1 million increase in other research and development expenses primarily for allocated overhead, including rent, equipment, depreciation, information technology costs and utilities.

Acquired In-Process Research and Development Expenses

We recorded acquired in-process research and development expenses of \$5.1 million in the nine months ended September 30, 2019. This was due to the acquisition of in-process research and development from uniQure as a result of the execution of an Amended and Restated Collaboration and License Agreement and a separate Collaboration and License Agreement. See Note 6 to our financial statements included elsewhere in this prospectus for further discussion regarding the accounting treatment of this transaction. We do not currently expect to recognize any acquired in-process research and development expenses in 2020.

General and Administrative Expenses

General and administrative expenses increased from \$7.9 million for the nine months ended September 30, 2019 to \$10.4 million for the nine months ended September 30, 2020. The increase of \$2.5 million, or 31%, was primarily due to the following:

- a \$1.6 million increase for personnel costs as a result of increased headcount of general and administrative personnel, including a \$0.6 million increase in employee and nonemployee director stock-based compensation expense; and

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- a \$0.7 million increase for allocated overhead, including rent, equipment, depreciation, information technology costs and utilities.

Other Income (Expense)

Other income (expense) decreased from \$1.3 million for the nine months ended September 30, 2019 to \$0.1 million for the nine months ended September 30, 2020. The decrease of \$1.2 million, or 93%, was primarily due to lower interest rates and lower average investment balances.

Comparison of the Years Ended December 31, 2018 and 2019

The following table summarizes our results of operations for the periods indicated (dollars in thousands):

	Year Ended December 31,		\$ Change	% Change
	2018	2019		
Revenue:				
Collaboration and license revenue	\$ 8,987	\$ 6,960	\$ (2,027)	(23%)
Collaboration and license revenue, related parties	5,143	26	(5,117)	(99%)
Total revenue	14,130	6,986	(7,144)	(51%)
Operating Expenses:				
Research and development	18,362	38,718	20,356	111%
Acquired in-process research and development	—	5,137	5,137	—
General and administrative	6,167	13,895	7,728	125%
Total operating expenses	24,529	57,750	33,221	135%
Loss from operations	(10,399)	(50,764)	(40,365)	388%
Other Income (Expense)	848	1,458	610	72%
Net loss and comprehensive loss	<u>\$ (9,551)</u>	<u>\$ (49,306)</u>	<u>\$ (39,755)</u>	<u>416%</u>

Revenue

Revenue decreased from \$14.1 million for the year ended December 31, 2018 to \$7.0 million for the year ended December 31, 2019. The decrease of \$7.1 million, or 51%, was primarily due to the following:

- a \$5.0 million decrease in revenue recognized as a result of termination of our Collaboration and License Agreement with Pfizer in 2018;
- a \$1.2 million decrease in revenue recognized under our Collaboration and License Agreement with Roche; and
- a \$0.5 million decrease in revenue recognized under our Collaboration and License Agreement with AstraZeneca.

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Research and Development Expenses

The following table provides a breakout of research and development expenses for the periods indicated (dollars in thousands):

	Year Ended December 31,		\$ Change	% Change
	2018	2019		
External expenses	\$ 9,740	\$21,342	\$11,602	119%
Payroll and personnel expenses	4,960	12,206	7,246	146%
Other research and development expenses	3,662	5,170	1,508	41%
Total research and development expenses	<u>\$18,362</u>	<u>\$38,718</u>	<u>\$20,356</u>	<u>111%</u>

Research and development expenses increased from \$18.4 million for the year ended December 31, 2018 to \$38.7 million for the year ended December 31, 2019. The increase of \$20.4 million, or 111%, was due to the following:

- an \$11.6 million increase in external costs as we continue to develop novel vectors and identify potential product candidates and progress our preclinical studies;
- a \$7.2 million increase in payroll and personnel expenses due to increased headcount of research and development personnel, including a \$1.6 million increase in employee stock-based compensation expense; and
- a \$1.5 million increase in other research and development expenses primarily for allocated overhead, including rent, equipment, depreciation, information technology costs and utilities.

Acquired In-Process Research and Development Expenses

We recorded acquired in-process research and development expenses of \$5.1 million in the year ended December 31, 2019. This was due to the acquisition of in-process research and development from uniQure as a result of the execution of an Amended and Restated Collaboration and License Agreement and a separate Collaboration and License Agreement. See Note 6 to our financial statements included elsewhere in this prospectus for further discussion regarding the accounting treatment of this transaction.

General and Administrative Expenses

General and administrative expenses increased from \$6.2 million for the year ended December 31, 2018 to \$13.9 million for the year ended December 31, 2019. The increase of \$7.7 million, or 125%, was due to the following:

- a \$2.6 million increase for personnel costs as a result of increased headcount of general and administrative personnel, including a \$0.6 million increase in employee stock-based compensation expense;
- a \$2.6 million increase for public offering costs incurred for the year ended December 31, 2019, which were expensed, as a result of delays in the IPO process;
- a \$2.1 million increase for professional services, including legal, accounting and other advisory services; and
- a \$0.4 million increase for allocated overhead, including rent, equipment, depreciation, information technology costs and utilities.

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Other Income (Expense)

Other income (expense) increased from \$0.8 million for the year ended December 31, 2018 to \$1.5 million for the year ended December 31, 2019. The increase of \$0.7 million, or 88%, was primarily due to increased interest income in 2019 as a result of higher average investment balances resulting from the \$84.5 million net proceeds from our Series B redeemable convertible preferred stock financing in August 2018.

Liquidity and Capital Resources

Sources of Liquidity

As of December 31, 2019 and September 30, 2020, we had cash and cash equivalents of \$49.7 million and \$88.8 million, respectively. We primarily generate cash and cash equivalents from the sale of our equity securities, including from the sale of our Series B and Series C redeemable convertible preferred stock, and to a lesser extent from cash received pursuant to our collaboration and license agreements.

In August 2018, we completed the private offering of 5,154,632 shares of our Series B redeemable convertible preferred stock at a price of \$17.46 per share. The net proceeds from the offering were \$84.5 million.

In April and June 2020, we completed the private offering of a total of 4,200,353 shares of our Series C redeemable convertible preferred stock at a price of \$18.00 per share. The net proceeds from the offering were \$72.5 million. This amount included a \$10.0 million investment from the Cystic Fibrosis Foundation (CFF). In return for the investment, CFF received shares of Series C redeemable convertible preferred stock, and the Company entered into a funding agreement (the Funding Agreement) with CFF. Except in certain limited circumstances, the \$10.0 million received from CFF will be used to advance the development program for 4D-710. Under the terms of the Funding Agreement, the \$10.0 million received from CFF is not restricted as to withdrawal or usage and is not held in any escrow or restricted accounts.

Future Funding Requirements

We have experienced recurring net losses and had an accumulated deficit of \$115.1 million as of September 30, 2020. Our transition to profitability is dependent upon the successful development, approval and commercialization of our product candidates and those of our collaboration partners and achieving a level of revenue adequate to support our cost structure. We do not expect to achieve such revenue and expect to continue to incur losses for the foreseeable future.

We expect that our research and development and general and administrative expenses will continue to increase for the foreseeable future. Additionally, we expect our capital expenditures will increase significantly in the future for costs associated with building additional manufacturing capacity. As a result, we will need significant additional capital to fund our operations, which we may obtain through one or more equity offerings, debt financings or other third-party funding, including potential strategic alliances and licensing or collaboration arrangements.

Because of the numerous risks and uncertainties associated with the development and commercialization of gene therapy product candidates, we are unable to estimate the amount of increased capital we will need to raise to support our operations and the outlays and operating expenditures necessary to complete the development of our product candidates and build additional manufacturing capacity, and we may use our available capital resources sooner than we currently expect.

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Our future capital requirements will depend on many factors, including:

- the progress of our current and future product candidates through preclinical and clinical development;
- potential delays in our preclinical studies and clinical trials, whether current or planned, due to the COVID-19 pandemic, or other factors;
- expanding our manufacturing facilities and working with our contract manufacturers to scale up the manufacturing processes for our product candidates;
- continuing our research and discovery activities;
- continuing the development of our Therapeutic Vector Evolution platform;
- initiating and conducting additional preclinical, clinical or other studies for our product candidates;
- changing or adding additional contract manufacturers or suppliers;
- seeking regulatory approvals and marketing authorizations for our product candidates;
- establishing sales, marketing and distribution infrastructure to commercialize any products for which we obtain approval;
- acquiring or in-licensing product candidates, intellectual property and technologies;
- making milestone, royalty or other payments due under any current or future collaboration or license agreements;
- obtaining, maintaining, expanding, protecting and enforcing our intellectual property portfolio;
- attracting, hiring and retaining qualified personnel;
- potential delays or other issues related to our operations;
- meeting the requirements and demands of being a public company;
- defending against any product liability claims or other lawsuits related to our products; and
- the impact of the COVID-19 pandemic, which may exacerbate the magnitude of the factors discussed above.

We believe that our existing cash and cash equivalents, together with the anticipated net proceeds from this offering, will enable us to fund our operating expenses and capital expenditure requirements at least into the fourth quarter of 2022.

Without giving effect to the anticipated net proceeds from this offering, based on our current operating plan, we expect that our existing cash and cash equivalents will not be sufficient to fund our operating expenses and capital expenditure requirements for the 12 months from the reissuance date of our financial statements for the year ended December 31, 2019 and from the issuance date of the unaudited interim financial statements for the nine months ended September 30, 2020. To finance our operations beyond that point, we will need to raise additional capital, which cannot be assured. We have concluded that this circumstance raises substantial doubt about our ability to continue as a going concern for at least one year from the date our annual and unaudited interim financial statements were available for reissuance and issuance, respectively. See Note 1 to our financial statements included elsewhere in this prospectus for additional information on our assessment. Similarly, our independent registered public accounting firm included an explanatory paragraph in its report on our reissued financial statements as of and for the year ended December 31, 2019, describing the existence of substantial doubt about our ability to continue as a going concern.

We have based our estimates as to how long we expect we will be able to fund our operations on assumptions that may prove to be wrong, and we could use our available capital resources sooner

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than we currently expect, in which case we would be required to obtain additional financing sooner than currently projected, which may not be available to us on acceptable terms, or at all. Our failure to raise capital as and when needed would have a negative impact on our financial condition and our ability to pursue our business strategy.

We do not have any committed external sources of funds. Accordingly, we will be required to obtain further funding through public or private equity offerings, debt financings, collaborations and licensing arrangements or other sources to complete the clinical development for the product candidates in treatment of Fabry disease, XLRP or choroideremia or any other indication we may pursue. If we raise additional funds by issuing equity securities, our stockholders may experience dilution. Any future debt financing into which we enter would result in fixed payment obligations and may involve agreements that include grants of security interests on our assets and restrictive covenants that limit our ability to take specific actions, such as incurring additional debt, making capital expenditures, granting liens over our assets, redeeming stock or declaring dividends, that could adversely impact our ability to conduct our business. Any debt financing or additional equity that we raise may contain terms that could adversely affect our common stockholders. Further, additional funds may not be available when we need them, on terms that are acceptable to us, or at all. Our ability to raise additional capital may be adversely impacted by potential worsening global economic conditions and the recent disruptions to and volatility in the credit and financial markets in the United States and worldwide resulting from the ongoing COVID-19 pandemic.

If we are unable to obtain additional funding, we expect to delay, reduce or eliminate some or all of our research and development programs, product portfolio expansion or investment in internal manufacturing capabilities, which could adversely affect our business. If we raise additional funds through collaborations or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to future revenue streams or product candidates or grant licenses on terms that may not be favorable to us.

Summary Statement of Cash Flows

The following is a summary of cash flows for the periods indicated below (in thousands):

	Year Ended December 31,		Nine Months Ended September 30,	
	2018	2019	2019	2020
Net cash used in operating activities	\$(16,252)	\$(36,711)	\$(28,025)	\$(33,410)
Net cash used in investing activities	(414)	(3,203)	(2,726)	(492)
Net cash provided by (used in) financing activities	84,577	(2,195)	(1,525)	73,005
Net increase (decrease) in cash and cash equivalents	<u>\$ 67,911</u>	<u>\$(42,109)</u>	<u>\$(32,276)</u>	<u>\$ 39,103</u>

Net Cash Used in Operating Activities

Net cash used in operating activities was \$33.4 million for the nine months ended September 30, 2020. This was primarily due to the net loss of \$36.1 million and a decrease in deferred revenue of \$2.1 million, which were partially offset by stock-based compensation expense of \$3.3 million and depreciation and amortization expense of \$1.1 million.

Net cash used in operating activities was \$28.0 million for the nine months ended September 30, 2019. This was primarily due to the net loss of \$33.2 million, which was partially offset by the acquisition of in-process research and development of \$5.1 million.

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Net cash used in operating activities was \$36.7 million for the year ended December 31, 2019. This was primarily due to the net loss of \$49.3 million, which was partially offset by the acquisition of in-process research and development of \$5.1 million, stock-based compensation expense of \$3.5 million, write-off of public offering costs of \$2.6 million and depreciation and amortization expense of \$1.0 million.

Net cash used in operating activities was \$16.3 million for the year ended December 31, 2018. This was primarily due to the net loss of \$9.6 million and a decrease in deferred revenue of \$8.6 million, which were partially offset by stock-based compensation expense of \$1.4 million and depreciation and amortization expense of \$0.7 million.

Net Cash Used in Investing Activities

Net cash used in investing activities was \$0.5 million for the nine months ended September 30, 2020, all of which was used to purchase property and equipment.

Net cash used in investing activities was \$2.7 million for the nine months ended September 30, 2019, all of which was used to purchase property and equipment.

Net cash used in investing activities was \$3.2 million for the year ended December 31, 2019, all of which was used to purchase property and equipment.

Net cash used in investing activities was \$0.4 million for the year ended December 31, 2018, all of which was used to purchase property and equipment.

Net Cash Provided by (Used in) Financing Activities

Net cash provided by financing activities was \$73.0 million for the nine months ended September 30, 2020, which was primarily due to \$72.5 million of net proceeds received from the issuance of our Series C redeemable convertible preferred stock in April and June 2020.

Net cash used in financing activities was \$1.5 million for the nine months ended September 30, 2019, which was primarily for payments of public offering costs of \$1.5 million.

Net cash used in financing activities was \$2.2 million for the year ended December 31, 2019, which was primarily for payments of public offering costs of \$2.3 million.

Net cash provided by financing activities was \$84.6 million for the year ended December 31, 2018, which was primarily due to \$84.5 million of net proceeds received from the issuance of our Series B redeemable convertible preferred stock in August 2018.

Contractual Obligations, Commitments and Contingencies

Our commitments include obligations under vendor contracts to provide research services and other purchase commitments with our vendors. In the normal course of business, we enter into services agreements with contract research organizations, contract manufacturing organizations and other third parties. Generally, these agreements provide for termination upon notice, with specified amounts due upon termination based on the timing of termination and the terms of the agreement. The actual amounts and timing of payments under these agreements are uncertain and contingent upon the initiation and completion of the services to be provided. These amounts are not fixed and determinable and therefore are not included in the table below.

The following table summarizes our contractual obligations, commitments and contingencies as of December 31, 2019 (in thousands):

	Total	Payments Due by Period			
		Less Than 1 Year	1-3 Years	3-5 Years	More Than 5 Years
Operating lease payments	\$29,896	\$ 2,759	\$ 5,866	\$ 6,207	\$ 15,064
Total contractual obligations	\$29,896	\$ 2,759	\$ 5,866	\$ 6,207	\$ 15,064

In October 2018, we entered into a long-term lease for additional office and laboratory space in Emeryville, California, at a cost of \$9.3 million over an 87-month term (the Second Lease). We concurrently amended our existing lease to extend the lease term to end at the same time as the Second Lease, which has a remaining cost of \$4.2 million.

In May 2019, we amended the Second Lease (the Second Lease Amendment) to add 17,497 square feet to the space being leased pursuant to the Second Lease. The Second Lease Amendment extended the term of the Second Lease to December 31, 2029.

Critical Accounting Policies and Significant Judgments and Estimates

This Management's Discussion and Analysis of Financial Condition and Results of Operations is based on our financial statements, which we have prepared in accordance with accounting principles generally accepted in the United States. The preparation of our financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of our financial statements, as well as the reported revenue and expenses during the reported periods. We evaluate these estimates and assumptions on an ongoing basis. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

Our significant accounting policies and recently announced accounting pronouncements, including the expected impact of such pronouncements, are described in Note 2 to our financial statements included elsewhere in this prospectus. We believe the following accounting policies are critical to the process of making significant judgments and estimates in the preparation of our financial statements and understanding and evaluating our reported financial results.

Revenue Recognition

Effective January 1, 2019, we adopted ASC 606, using the modified retrospective transition method. As a result, we changed our accounting policies for revenue recognition as detailed below.

We determine revenue recognition for arrangements within the scope of ASC 606 by performing the following five steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when (or as) we satisfy each performance obligation.

Our revenue is primarily derived through our license, research, development and commercialization agreements. The terms of these types of agreements may include (i) licenses to our technology, (ii) research and development services, and (iii) services or obligations in connection with participation in research or steering committees. Payments to us under these arrangements typically include one or more of the following: nonrefundable upfront and license fees, research funding, milestone and other contingent payments to us for the achievement of defined collaboration objectives and certain preclinical, clinical, regulatory and sales-based events, as well as royalties on sales of any commercialized products. Arrangements that include upfront payments are recorded as deferred revenue upon receipt or when due and may require deferral of revenue recognition to a future period until performance obligations are met. The event-based milestone payments, royalties and cost

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reimbursements represent variable consideration, and we use the most likely amount method to estimate this variable consideration. Royalty payments are recognized when earned or as the sales occur. We record cost reimbursements as accounts receivable when right to consideration is unconditional.

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account in ASC 606. We allocate the total transaction price to each performance obligation based on the estimated selling price and recognize revenue when, or as, the performance obligation is satisfied. We include the unconstrained amount of estimated variable consideration in the transaction price. At the end of each reporting period, we re-evaluate the estimated variable consideration included in the transaction price and any related constraint, and if necessary, adjust our estimate of the overall transaction price.

Prior to the adoption of ASC 606 on January 1, 2019, we recognized revenue when all of the following criteria were met: persuasive evidence of an arrangement exists; transfer of technology has been completed or services have been rendered; the price to the customer is fixed or determinable and collectability is reasonably assured.

In arrangements involving the delivery of more than one element, each required deliverable was evaluated to determine whether it qualified as a separate unit of accounting. The determination was based on whether the deliverable had “standalone value” to the customer. If a deliverable did not qualify as a separate unit of accounting, it was combined with the other applicable undelivered item(s) within the arrangement and these combined deliverables were treated as a single unit of accounting.

The arrangement’s consideration that was fixed or determinable was allocated to each separate unit of accounting based on the relative selling price methodology in accordance with the selling price hierarchy, which included vendor-specific objective evidence (VSOE) of selling price, if available, or third-party evidence of selling price if VSOE was not available, or the best estimate of selling price, if neither VSOE nor third-party evidence was available.

Payments or reimbursements for our research and development efforts for the arrangements where such efforts were considered as deliverables were recognized as the services were performed and were presented on a gross basis. When upfront payments were received and if there was no discernible pattern of performance, we recognized revenue ratably over the associated period of performance.

Accrued Research and Development Expenses

We estimate our accrued research and development expenses as of each balance sheet date. This process involves reviewing contracts and purchase orders with service providers, identifying services that have been performed on our behalf and estimating the level of service performed, the expected remaining period of performance and the associated expenses incurred for the service when we have not yet been invoiced or otherwise notified of actual cost. Depending on the timing of payments to the service providers and the estimated expenses incurred, we may record net prepaid or accrued research and development expenses relating to these costs.

Examples of estimated accrued research and development expenses include fees paid to:

- CROs in connection with preclinical development and clinical studies; and
- CMOs and other vendors related to process development and manufacturing of materials for use in preclinical development and clinical studies.

Our understanding of the status and timing of services performed relative to the actual status and timing may vary and may result in us reporting changes in estimates in any particular period. To date, there have been no material differences from our estimates to the amounts actually incurred.

Stock-Based Compensation

We use a fair value-based method to account for all stock-based compensation arrangements with employees and nonemployees including stock options and stock awards. Our determination of the fair value of stock options on the date of grant utilizes the Black-Scholes option pricing model.

The fair value of the option granted is recognized on a straight-line basis over the period during which an optionee is required to provide services in exchange for the option award, known as the requisite service period, which usually is the vesting period. Prior to January 1, 2020, the stock-based compensation expense for nonemployees was subject to remeasurement until the related vesting conditions were met. Effective January 1, 2020, the measurement date for nonemployee awards is the date of grant without changes in the fair value of the award. We account for forfeitures as they occur for both employees and nonemployees.

Estimates of the fair value of equity awards as of the grant date using valuation models such as the Black-Scholes option pricing model are affected by assumptions with a number of complex variables.

Changes in the following assumptions can materially affect the estimate of fair value and ultimately how much stock-based compensation expense is recognized; and the resulting change in fair value, if any, is recognized in our statement of operations and comprehensive loss during the period the related services are rendered. These inputs are subjective and generally require significant analysis and judgment to develop:

- *Expected Term*—The expected term for employee options is calculated using the simplified method as we do not have sufficient historical information to provide a basis for estimate. The simplified method is based on the average of the vesting tranches and the contractual life of each grant. The expected term for nonemployee options is the contractual term of the options.
- *Expected Volatility*—For all stock options granted to date, the expected volatility was estimated based on a study of publicly traded industry peer companies as we did not have any trading history for our common stock. We selected the peer group based on similarities in industry, stage of development, size and financial leverage with our principal business operations. For each grant, we measured historical volatility over a period equivalent to the expected term.
- *Risk-Free Interest Rate*—The risk-free interest rate is based on the yield available on U.S. Treasury zero-coupon issues whose term is similar in duration to the expected term of the respective stock option.
- *Expected Dividend Yield*—We have not paid and do not currently anticipate paying any dividends on our common stock. Accordingly, we have estimated the dividend yield to be zero.

As of September 30, 2020, the unrecognized stock-based compensation expense related to stock options was \$14.7 million and is expected to be recognized as expense over a weighted-average period of approximately 3.0 years. The intrinsic value of all outstanding stock options as of September 30, 2020 was approximately \$34.8 million, based on the assumed initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, of which approximately \$20.5 million related to vested options and approximately \$14.3 million related to unvested options.

Common Stock Valuations

The estimated fair value of the common stock underlying our stock options and stock awards was determined at each grant date by our board of directors, with input from management. All options to purchase shares of our common stock are intended to be exercisable at a price per share not less than the per share fair value of our common stock underlying those options on the date of grant.

In the absence of a public trading market for our common stock, on each grant date, we develop an estimate of the fair value of our common stock based on the information known to us on the date of grant, upon a review of any recent events and their potential impact on the estimated fair value per share of our common stock, and in part on input from an independent third-party valuation firm.

Our valuations of our common stock were determined in accordance with the guidelines outlined in the American Institute of Certified Public Accountants Practice Aid, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation* (the Practice Aid).

The assumptions used to determine the estimated fair value of our common stock are based on numerous objective and subjective factors, combined with management's judgment, including:

- external market conditions affecting the pharmaceutical and biotechnology industry and trends within the industry;
- our stage of development and business strategy;
- the rights, preferences and privileges of our redeemable convertible preferred stock relative to those of our common stock;
- the prices at which we sold shares of our redeemable convertible preferred stock;
- our financial condition and operating results, including our levels of available capital resources;
- the progress of our research and development efforts;
- equity market conditions affecting comparable public companies;
- general U.S. market conditions; and
- the lack of marketability of our common stock.

The Practice Aid identifies various available methods for allocating enterprise value across classes and series of capital stock to determine the estimated fair value of our common stock at each valuation date. In accordance with the Practice Aid, we considered the following methods:

- Option Pricing Method. Under the option pricing method (OPM) shares are valued by creating a series of call options with exercise prices based on the liquidation preferences and conversion terms of each equity class. The estimated fair values of the preferred and common stock are inferred by analyzing these options.
- Probability-Weighted Expected Return Method. The probability-weighted expected return method (PWERM) is a scenario-based analysis that estimates value per share based on the probability-weighted present value of expected future investment returns, considering each of the possible outcomes available to us, as well as the economic and control rights of each share class.

Based on our early stage of development and other relevant factors, we determined that a hybrid approach of the OPM and the PWERM methods was the most appropriate method for allocating our enterprise value to determine the estimated fair value of our common stock. In determining the estimated fair value of our common stock, our board of directors also considered the fact that our

stockholders could not freely trade our common stock in the public markets. Accordingly, we applied discounts to reflect the lack of marketability of our common stock based on the weighted-average expected time to liquidity. The estimated fair value of our common stock at each grant date reflected a non-marketability discount partially based on the anticipated likelihood and timing of a future liquidity event.

Following the completion of this offering, our board of directors intends to determine the fair value of our common stock based on the closing quoted market price of our common stock on the date of grant.

Redeemable Convertible Preferred Stock

We record all shares of redeemable convertible preferred stock at their respective fair values on the dates of issuance, net of issuance costs. The redeemable convertible preferred stock is recorded outside of permanent equity because while it is not mandatorily redeemable, in certain events considered not solely within our control, such as a merger, acquisition, or sale of all or substantially all of our assets, each of which we refer to as a deemed liquidation event, the convertible preferred stock will become redeemable at the option of the holders of at least a majority of the then outstanding such shares. We have not adjusted the carrying values of the redeemable convertible preferred stock to its liquidation preference because a deemed liquidation event obligating us to pay the liquidation preferences to holders of shares of redeemable convertible preferred stock is not probable of occurring. Subsequent adjustments to the carrying values to the liquidation preferences will be made only when it becomes probable that such a deemed liquidation event will occur.

Income Taxes

We account for income taxes under the asset and liability method, which requires, among other things, that deferred income taxes be provided for temporary differences between the financial statement reporting and tax basis of our assets and liabilities. In addition, deferred tax assets are recorded for the future benefit of utilizing net operating losses and research and development credit carryforwards and are measured using the enacted tax rates and laws that will be in effect when such items are expected to reverse. A valuation allowance is provided against deferred tax assets unless it is more likely than not that they will be realized.

We account for uncertain tax positions by assessing all material positions taken in any assessment or challenge by relevant taxing authorities. Assessing an uncertain tax position begins with the initial determination of the position's sustainability and is measured at the largest amount of benefit that is greater than fifty percent likely of being realized upon ultimate settlement. Our policy is to recognize interest and penalties related to the underpayment of income taxes as a component of income tax expense or benefit. To date, there have been no interest or penalties charged in relation to the unrecognized tax benefits.

NOLs and tax credit carryforwards are subject to review and possible adjustment by the Internal Revenue Service (IRS) and may become subject to an annual limitation in the event of certain cumulative changes in the ownership interest of significant stockholders over a three-year period in excess of 50% as defined under Sections 382 and 383 in the Internal Revenue Code, which could limit the amount of tax attributes that can be utilized annually to offset future taxable income or tax liabilities. The amount of the annual limitation is determined based on our value immediately prior to the ownership change. We have experienced ownership changes in the past. As a result of the ownership changes, we determined that \$0.9 million of our NOLs will expire unutilized for federal income tax purposes and such amounts are excluded from our NOLs as of December 31, 2019. Subsequent ownership changes may result in additional limitations.

Off-Balance Sheet Arrangements

Since our inception, we have not engaged in any off-balance sheet arrangements as defined in the rules and regulations of the SEC.

Quantitative and Qualitative Disclosures about Market Risk

Interest Rate Sensitivity

The market risk inherent in our financial instruments and in our financial position represents the potential loss arising from adverse changes in interest rates. As of September 30, 2020, we had cash and cash equivalents of \$88.8 million, consisting of bank deposits and interest-bearing money market funds, for which the fair value would be affected by changes in the general level of U.S. interest rates. However, due to the short-term maturities of our cash equivalents, an immediate 10% change in interest rates would not have a material effect on the fair value of our cash equivalents.

Effects of Inflation

Inflation generally affects us by increasing our cost of labor and development costs. We do not believe that inflation has had a significant impact on our results of operations for any periods presented herein.

JOBS Act

We are an emerging growth company, as defined in the Jumpstart Our Business Startups Act of 2012 (the JOBS Act). Under the JOBS Act, emerging growth companies may delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act until such time as those standards apply to private companies. We have elected to avail ourselves of this exemption from new or revised accounting standards and, therefore, while we are an emerging growth company, we will not be subject to new or revised accounting standards at the same time that they become applicable to other public companies that are not emerging growth companies. As a result, our financial statements may not be comparable to companies that comply with new or revised accounting pronouncements as of public company effective dates.

We will remain an emerging growth company until the earlier of (i) the last day of the year following the fifth anniversary of the completion of this offering, (ii) the last day of the year in which we have total annual gross revenue of at least \$1.07 billion, (iii) the last day of the year in which we are deemed to be a "large accelerated filer" as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended (the Exchange Act), which would occur if the market value of our common stock held by non-affiliates exceeded \$700.0 million as of the last business day of the second fiscal quarter of such year, or (iv) the date on which we have issued more than \$1.0 billion in non-convertible debt securities during the prior three-year period. An emerging growth company may take advantage of specified reduced reporting requirements and is relieved of certain other significant requirements that are otherwise generally applicable to public companies. As an emerging growth company:

- we will present only two years of audited financial statements, plus unaudited financial statements for any interim period, and related management's discussion and analysis of financial condition and results of operations;
- we will avail ourselves of the exemption from the requirement to obtain an attestation and report from our auditors on the assessment of our internal control over financial reporting pursuant to the Sarbanes-Oxley Act of 2002 (the Sarbanes-Oxley Act);
- we will provide less extensive disclosure about our executive compensation arrangements;

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- we will not require stockholder non-binding advisory votes on executive compensation or golden parachute arrangements; and
- we will take advantage of extended transition periods to comply with new or revised accounting standards, delaying the adoption of these accounting standards until they would apply to private companies.

As a result, the information in this prospectus and that we provide to our investors in the future may be different than what you might receive from other public reporting companies.

Recent Accounting Pronouncements

See Note 2 to our financial statements included elsewhere in this prospectus for information.

BUSINESS

Overview

We are a clinical-stage gene therapy company pioneering the development of product candidates using our targeted and evolved AAV vectors. We seek to unlock the full potential of gene therapy using our platform, Therapeutic Vector Evolution, which combines the power of directed evolution with our approximately one billion synthetic capsid sequences to invent evolved vectors for use in targeted gene therapy products. Our targeted and evolved vectors are invented with the goal of being delivered through clinically routine, well-tolerated and minimally invasive routes of administration, of transducing diseased cells in target tissues efficiently, of having reduced immunogenicity and, where relevant, of having resistance to pre-existing antibodies. We believe these key features will help us to potentially create targeted gene therapy product candidates with improved therapeutic profiles, and to address a broad range of diseases from rare to large patient populations, including those that other gene therapies are unable to address. Each of our product candidates is created with one of our targeted and evolved AAV vectors. Our platform is designed to be modular, in that an evolved vector invented for a given set of diseases can be equipped with different transgene payloads to treat other diseases affecting the same tissue types. We believe this modularity will help inform the clinical development of subsequent product candidates using the same vector.

We have built a deep portfolio of gene therapy product candidates initially focused in three therapeutic areas: ophthalmology (intravitreal vector), cardiology (intravenous vector) and pulmonology (aerosol vector). We have three product candidates that are in clinical trials: 4D-125 for the treatment of X-linked retinitis pigmentosa (XLRP) in a Phase 1/2 clinical trial, 4D-110 for the treatment of choroideremia in a Phase 1 clinical trial, and 4D-310 for the treatment of Fabry disease in a Phase 1/2 clinical trial. Our two IND candidates are 4D-150 for the treatment of wet age-related macular degeneration (wet AMD), and 4D-710 for the treatment of cystic fibrosis lung disease. We expect to file the INDs and to initiate clinical trials for both of these programs in second half of 2021.

We believe our competitive advantages, combined with our highly experienced team, helps to position our company to create, develop, manufacture, if approved, and effectively commercialize targeted gene therapies that could transform the lives of patients suffering from debilitating diseases.

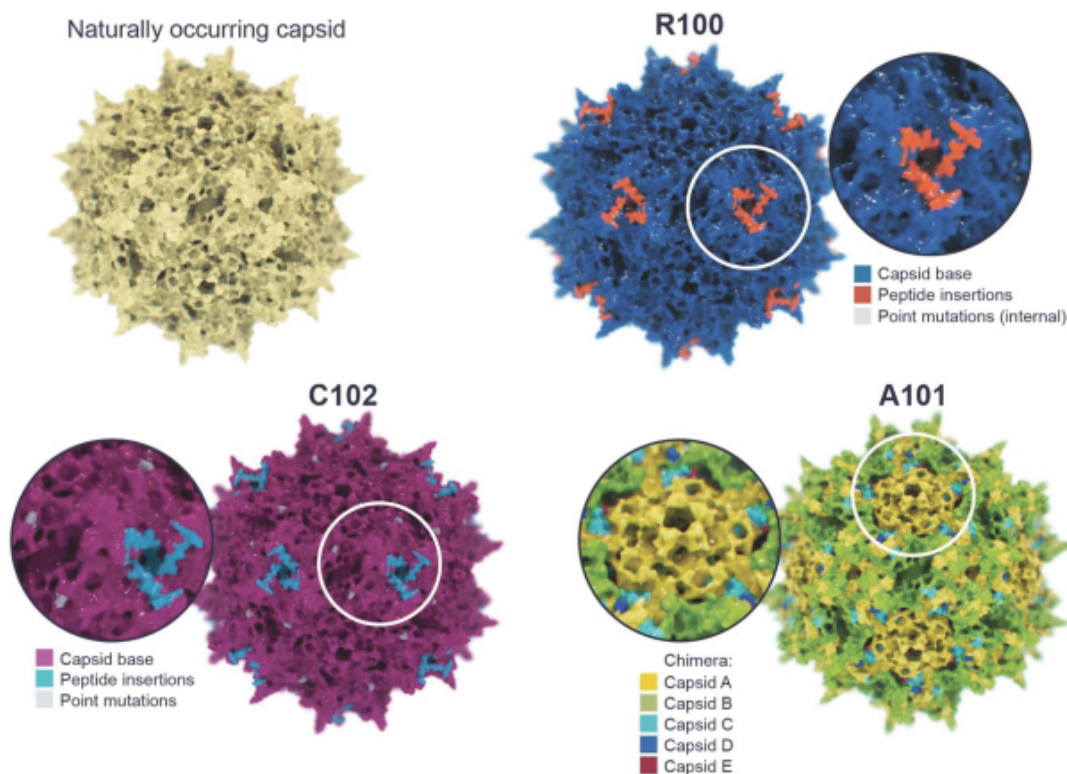
Our Approach: Therapeutic Vector Evolution Platform

Gene therapy holds tremendous promise as a transformative therapeutic class. However, the majority of gene therapies have encountered limitations such as inflammation and toxicity, high dose requirements, limited efficacy and neutralization by pre-existing antibodies, due in part to their utilization of conventional AAV vectors that are naturally occurring and non-targeted. Through our Therapeutic Vector Evolution platform we apply the principles of directed evolution to invent targeted and evolved vectors for the delivery of genes to specific tissue types for diseases involving the same target tissue(s). Our product candidates are designed and engineered to utilize our targeted and evolved vectors to potentially address the limitations encountered with gene therapies utilizing conventional AAV vectors.

Leveraging a wide range of molecular biology techniques, we have developed a collection of 40 distinct libraries that are comprised of approximately one billion synthetic capsid sequences. We next define a Target Vector Profile that identifies the optimal vector features for the specific tissue type(s) and related set of diseases we seek to target, with the goal of overcoming limitations encountered by conventional AAVs. We then deploy Therapeutic Vector Evolution with our capsid libraries in NHPs and use competitive selection to identify targeted and evolved vectors from our libraries that demonstrate the strongest match to the Target Vector Profile. Our three lead vectors have unique structural changes as compared to the conventional naturally occurring AAV capsid as shown below.

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Our three lead targeted and evolved vectors comprise numerous diverse and biologically important differences from the conventional AAV capsid, as illustrated in the computer generated representations of the three-dimensional capsid structures depicted below. The colored areas illustrate these differences.






Based on preclinical data reported to date from our NHP and human cell models, including preclinical head-to-head comparisons with relevant conventional AAV vectors, we observed that our targeted and evolved vectors were well-tolerated and achieved enhanced delivery, increased transgene expression, reduced immunogenicity and/or improved antibody resistance when compared to conventional AAV vectors. We have not compared our targeted and evolved vectors to conventional AAV vectors in patients in clinical studies.

As we advance through clinical trials, we plan to evaluate the following potential design features of our targeted and evolved vectors and product candidates:

- **Tolerability:** Well-tolerated therapies with a low inflammation profile, low dose requirements and routine, safe routes of delivery
- **Biologic activity:** Effective delivery to targeted tissues, efficient transgene expression in targeted tissues, and/or resistance to neutralization by pre-existing antibodies
- **Routine routes of administration:** Routine, well-tolerated and minimally invasive routes of administration, including intravitreal, aerosol and intravenous delivery
- **Antibody resistance:** Resistance to neutralization by pre-existing antibodies, translating into improved efficacy, larger addressable patient populations, and the potential for re-dosing

Our Product Candidate Pipeline

We are developing a diverse pipeline of product candidates for both rare and large market diseases, including patient populations that other gene therapies are unable to address. Our initial product candidates are focused on the following therapeutic areas: ophthalmology, cardiology and pulmonology. Each of our product candidates leverages a targeted and evolved vector we invented through our Therapeutic Vector Evolution platform. Below is a summary of our product candidate pipeline and our next anticipated milestones:

VECTOR Delivery	PRODUCT CANDIDATE	INDICATION	RESEARCH [§]	IND-ENABLING	PHASE 1	PHASE 2	PHASE 3	PRODUCT RIGHTS
R100 Intravitreal 	OPHTHALMOLOGY							
	4D-125	XLRP	Initial Data 2021					4DMT*
	4D-110	CHM	Initial Data 2022 [‡]					Roche
	4D-150	Wet AMD	Initiate Ph 1/2 2H-2021					4DMT
DR/DME							4DMT	
C102 IV 	CARDIOLOGY							
	4D-310	Fabry Disease	Initial Data 2021					4DMT
A101 Aerosol 	PULMONOLOGY							
	4D-710	Cystic Fibrosis	Initiate Ph 1/2 2H-2021					4DMT

* 4DMT is responsible for the development of this product candidate; Roche has an exclusive option to assume development and commercialization at its sole cost and expense. Such an option may be exercised prior to pivotal trial initiation.

‡ Reporting in coordination with our partner Roche.

§ The Research stage involves (1) defining the Target Vector Profile then deploying Therapeutic Vector Evolution with our capsid libraries in non-human primates (NHPs) and using competitive selection to identify targeted and evolved vectors from our libraries that demonstrate the strongest match to the Target Vector Profile; then (2) optimizing our product candidates using the lead vector by conducting in vivo and in vitro evaluation of various transgene and promoter construct candidates in cell and animal models, and the selection of at least one product candidate to move forward into IND-enabling studies.

Ophthalmology Pipeline: Intravitreal Product Candidates

We are developing product candidates to treat tissues throughout the retina. Our targeted and evolved AAV vector, R100, was invented for routine intravitreal injection, leading to transgene expression across the entire surface area of the retina, and in the major cell layers of the retina.

We currently have four ophthalmology product candidates that utilize our proprietary intravitreal R100 vector:

1. **4D-125:** 4D-125 is in an ongoing Phase 1/2 clinical trial in patients with XLRP due to mutations in the *RPGR* gene. We are enrolling patients with a broad range of disease severity, including those earlier in the progression of their disease. We expect to report initial clinical data from this trial in 2021. We currently hold worldwide commercialization rights for 4D-125, and Roche holds an exclusive option to in-license the product prior to pivotal trial initiation.
2. **4D-110:** 4D-110 is in an ongoing Phase 1 clinical trial in patients with choroideremia. We are enrolling patients with a broad range of disease severity, including those earlier in the progression of their disease. In coordination with our partner Roche, we expect to report initial clinical data from this trial in 2022. We licensed exclusive worldwide rights to 4D-110 to Roche.

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3. **4D-150:** 4D-150 is in IND-enabling preclinical development for wet AMD and diabetic retinopathy, two large market ophthalmology indications. We wholly own this product candidate. We expect to file an IND and to initiate a Phase 1/2 clinical trial for 4D-150 in the second half of 2021.
4. **4D-135:** 4D-135 is in preclinical development for autosomal dominant retinitis pigmentosa (adRP) due to mutations in the *RHO* gene. We wholly own this product candidate. We expect to initiate IND-enabling studies for 4D-135 in 2021.

Cardiology Pipeline: Intravenous Product Candidates

With our cardiology product candidates, all of which are wholly owned, we plan to treat patient populations in both primary cardiomyopathies, that involve the heart only, as well as cardiomyopathies that are secondary to systemic diseases, such as lysosomal storage diseases. Our cardiology product candidates utilize our targeted and evolved AAV vector, C102, which was invented for routine low dose intravenous administration and delivery to the heart, leading to transgene expression in heart muscle cells throughout the organ. For lysosomal storage diseases involving the heart and other organs, including Fabry disease, our product candidates are designed for transgene expression both within the heart and in other targeted tissues.

Our initial cardiology product candidate 4D-310 is in an ongoing Phase 1/2 clinical trial in adult patients with classic (severe) Fabry disease. 4D-310 is designed to address all critically affected organs, including the heart, kidney, and blood vessels through direct intracellular transgene expression. To our knowledge, 4D-310 is the only Fabry product candidate specifically designed to treat cardiomyocytes. We expect to report initial clinical data from this trial in 2021.

Pulmonology Pipeline: Aerosol Delivery Product Candidates

With our pulmonology product candidates, all of which are wholly owned, we plan to treat diseases that affect the lungs. Our pulmonology product candidates utilize our targeted and evolved vector, A101, which was invented for aerosol delivery to all major regions within the lung, including airways and alveoli, and successful penetration of the mucus barrier for transduction of lung airway cells, overcoming potential barriers such as pre-existing AAV antibodies and other inhibitory proteins within the mucus barrier. Our products utilizing A101 are designed for delivery as an aerosol to the lung epithelial cell surface resulting in efficient airway and alveolar cell transduction and transgene expression.

Our initial pulmonology product candidate 4D-710 is in IND-enabling preclinical development for cystic fibrosis lung disease. We expect to file an IND and to initiate a Phase 1/2 clinical trial for 4D-710 in the second half of 2021.

Our Team

Our experienced team consists of biotherapeutics developers, entrepreneurs, innovative gene therapy scientists and clinicians to execute our platform, product design and development and commercialization strategies. Collectively, our team has more than 100 years of combined experience in the field of viral vector gene therapy, including leadership of over 30 clinical trials from Phase 1 through Phase 3 and product approval. We are led by our Chief Executive Officer and co-founder, David Kirn, M.D., who has over 25 years of experience creating and growing therapeutic platform companies, including viral vector gene therapy and oncolytic virus technologies, and advising on the design, preclinical translation and clinical development of viral vector gene therapeutics for leading life science companies, such as Onyx Pharmaceuticals, Novartis International AG, Pfizer Inc., Bayer AG and Biogen Inc. Our Executive Chairman, John Milligan, Ph.D., is the former CEO and President of Gilead Sciences, where he spent over 29 years scaling the company and commercializing numerous

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transformative therapies across multiple disease areas. Our Chief Scientific Advisor and co-founder, David Schaffer, Ph.D., pioneered the application of directed evolution to the capsid of AAV vectors 20 years ago. Our Chief Operating Officer and Chief Technical Officer, Fred Kamal, Ph.D., has over 25 years of industry experience in product manufacturing and quality, including most recently with AveXis, Inc. where he was a key contributor to the development and biologics license application (BLA) for the AAV product Zolgensma (onasemnogene abeparvovec). Our Chief Medical Officer, Robert S. Fishman, M.D., brings over 20 years of clinical trial execution and product development expertise. Our board of directors also brings significant experience in biopharmaceutical commercial execution and strategic initiatives.

Our Strategy

Our vision is to unlock the full potential of gene therapy to address as many patient populations as possible in both rare and large market diseases. We have developed the following strategies and guiding principles to achieve our goals:

Invent targeted and evolved AAV vectors using the power of directed evolution to unlock the full potential of gene therapy with transformative gene therapy products

Our Therapeutic Vector Evolution platform allows us to move beyond conventional AAV vectors and has enabled us to develop proprietary targeted and evolved vectors based on a Target Vector Profile for any set of diseases we strive to treat. This platform empowers us to select the best (or “fittest”) targeted and evolved vector, matching the Target Vector Profile for any set of related diseases, out of our 40 distinct libraries comprising approximately one billion synthetic capsid sequences. Our goal is to unlock the full potential of gene therapy by creating targeted gene therapies based on these vectors. As compared to gene therapy products utilizing conventional AAV vectors, we believe our targeted gene therapies, if approved, will enable treatment of broader patient populations within specific diseases, diseases currently not addressed by gene therapy and large market diseases.

Apply our modular product design and engineering to help inform the clinical development of subsequent product candidates using the same vectors used for prior product candidates

Our targeted gene therapy product candidates are modular, in that a single targeted and evolved vector can be equipped with different transgene payloads to enable treatment of multiple different diseases affecting the same tissue type(s). Our preclinical and clinical development will provide us with insights and clinical proof-of-concept for a given vector equipped with one transgene. Development of subsequent product candidates could also be more efficient, as manufacturing, preclinical, clinical and regulatory activities will be guided by experience with preceding product candidates using the same vector.

Develop and commercialize a diverse portfolio of transformative gene therapy products in a broad range of therapeutic areas with significant unmet needs, including rare and large patient populations

We are building a diverse portfolio of product candidates. We believe this diversity increases our likelihood of success in contrast to relying on a single vector or disease area as evidenced by our: (1) multiple proprietary vectors delivered by different routine, well-tolerated and minimally invasive routes of administration specific to the disease, (2) therapeutic area diversity including ophthalmology, cardiology and pulmonology; and (3) opportunity to address both rare and large patient populations not currently addressed with conventional AAV vectors. We seek to develop our wholly owned product candidates through market approval and to retain product marketing rights for key products, regions and strategic therapeutic areas.

Build a fully integrated biopharmaceutical company by advancing our capabilities in product development and commercialization, and expanding our manufacturing facilities and internal proprietary Good Manufacturing Practice (GMP) capabilities

To become a fully integrated biopharmaceutical company, we are building robust internal capabilities including translational and clinical research and development, regulatory affairs, manufacturing and quality which can mitigate operational risks, reduce costs, and increase product development control and speed. In the future we intend to build commercialization capabilities, including sales and marketing.

We believe robust internal manufacturing capabilities are of particular importance in gene therapy due to the high complexity of producing these therapies. Our current in-house manufacturing capabilities include GMP manufacturing, production capabilities for IND-enabling GLP toxicology studies and research candidate production (upstream, downstream and fill/finish). We intend to further maximize the robustness and internal control of our manufacturing processes from discovery and process development through to clinical-grade cGMP manufacturing and to scale these capabilities to support later stage clinical programs and indications where clinical trials require more patients and/or higher intravenous doses. In the future we intend to build manufacturing capacity sufficient to support commercialization of any product candidates that are approved.

Selectively execute strategic collaborations to maximize the potential value of our Therapeutic Vector Evolution platform

We intend to enter into patient advocacy foundation alliances and academic collaborations, and to evaluate potential strategic corporate partnerships. We believe that alliances with patient advocacy organizations, such as the Cystic Fibrosis Foundation, can be beneficial for funding, patient enrollment, regulatory strategy, product design and clinical development. In addition, we intend to further expand our enabling technologies and our intellectual property portfolio by pursuing new opportunities through our sponsored research agreements with our Chief Scientific Advisor Dr. Schaffer and U.C. Berkeley. We will continue to evaluate new opportunities to partner with biopharmaceutical companies that we believe enhance our ability to deliver value for stockholders and clinical benefits for patients.

Our Therapeutic Vector Evolution Platform

Gene Therapy Successes and Limitations of Current Conventional Non-Targeted AAV Vectors

Gene Therapy Overview

Gene therapy aims to address diseases caused by gene mutations and gene dysregulation. Gene therapies hold the promise of delivering transformative and durable benefit to the patient by addressing the underlying molecular root cause of genetic diseases, in many cases, by introducing a functional version of the patient's defective gene into their own cells. Gene therapy has shown the potential to halt the progression of rare diseases, as well as to enable or restore critical human functions. Gene therapies may be delivered to their target cells either *in vivo* or *ex vivo* and can be paired with other therapeutic approaches including cell therapy and gene editing.

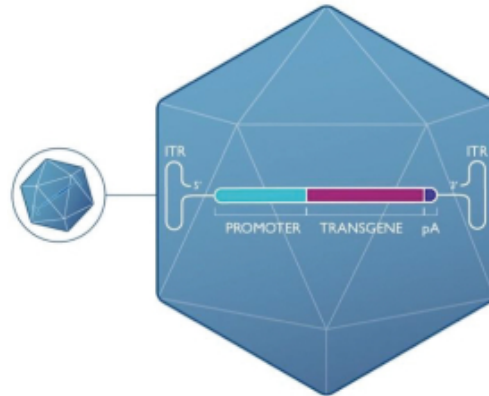
The transformative potential of gene therapy has been demonstrated across multiple rare disease areas. There has been significant progress over the last decade in the field of gene and cell therapies, including with AAV based gene therapy. Further, the number of companies developing gene and cell therapy products has increased significantly over the last five years. There are currently a number of approved viral vector gene therapy products, including Zynteglo, Zolgensma, Luxturna, Imlygic and Strimvelis.

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The physical construct of gene therapies are comprised of two essential components:

- **Vector:** A vehicle that packages and delivers the promoter and transgene into the body and transports them through the protective cell membrane and ultimately into the cell nucleus. As a result, the vector plays an essential role in delivery and transduction, the process of guiding the transgene into the cell with subsequent expression of the transgene product. The vector is foundational to the potential safety and efficacy of gene therapies, as the vector is ideally relied on to deliver the promoter and transgene to the diseased cells safely and in sufficient quantities to result in clinical benefit.
- **Promoter and Transgene Payload:** The promoter is the DNA region that controls and initiates transcription of the transgene in the desired cell type(s), while the transgene is the functional gene intended to be delivered into the target cell and expressed at the RNA and/or protein levels. Examples include enzymes, structural proteins, cell surface protein receptors, antibodies, gene editing machinery and inhibitory RNA molecules.

Generalized components of an AAV gene therapy include the vector and a therapeutic payload consisting of DNA encoding a promoter, transgene, polyadenylated (pA) tail for stability, and inverted terminal repeats (ITR) to support packaging and other functionality within the target cell.



Key Challenges with Conventional AAV Vectors

The fundamental gene therapy components used in current gene therapy candidates originated largely from academia, some as early as the 1960s, with limited improvements since their discovery. The majority of AAV gene therapy companies use conventional AAV vectors that are comprised of naturally occurring AAV capsids (protein shells) of a few specific subtypes, including AAV1, AAV2, AAV5, AAV8, AAV9, AAVhu68, AAVrh10, and AAVrh74. In some cases, minor changes have been made to these naturally occurring, non-targeted capsids in an attempt to enhance non-specific transduction. While gene therapy holds tremendous promise as a transformative therapeutic class, the demonstrated hurdles with conventional AAV vectors may limit the diseases and patient populations that can be effectively addressed.

We believe that there are four fundamental challenges that hinder gene therapies that utilize conventional AAV vectors which may adversely impact their product safety, efficacy and commercial potential:

1. Lack of effective delivery to desired target tissues and/or cell types due to physical barriers: Conventional AAV vectors have not been engineered to circumvent natural

barriers to viral vector delivery by various routes of delivery, such as the inner-limiting membrane of the retina or clearance by the liver, and they are not targeted to specific tissues or cells. As a result, products using these vectors may require suboptimal delivery mechanisms, such as subretinal injection compared with intravitreal dosing, or high doses, such as with intravenous administration for the treatment of muscle diseases, to achieve therapeutic benefit. These strategies may result in toxicities and even patient deaths, as well as commercialization challenges.

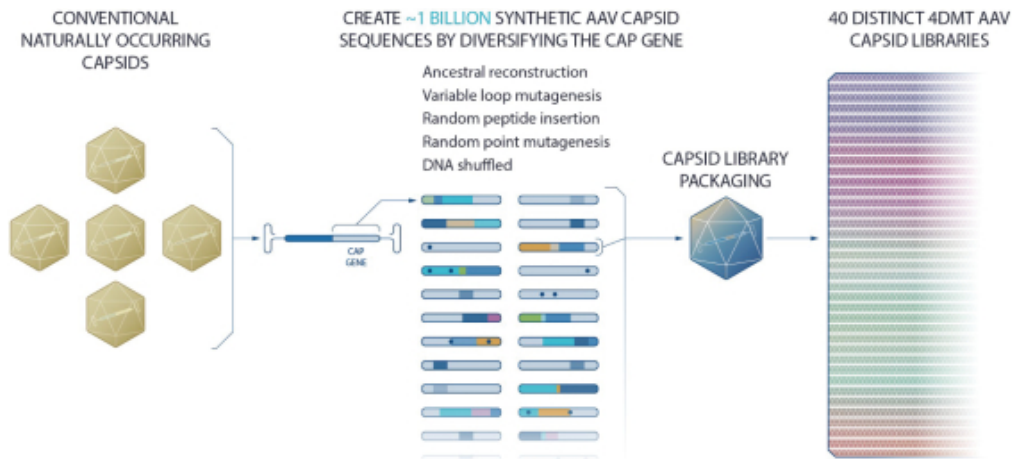
2. **Lack of efficient transduction and transgene expression from target cells:** To yield therapeutic benefit, the vector must efficiently deliver its transgene from the cell surface into the target cell nucleus, resulting in subsequent therapeutic transgene expression within the cell. Conventional AAV vectors are not engineered for efficient transduction of specific target cells. As a consequence, conventional AAV vectors may be associated with inefficient transduction and transgene expression which would limit efficacy.
3. **Potential to cause toxicity due to inflammation:** Conventional AAV vectors have been associated with inflammation-related toxicities in some patients. Potential contributing factors may include the lack of specificity with current conventional AAV vectors, the high intravenous doses required for delivery to target tissues systemically, and the ability of these conventional AAV vectors to transduce immune cells. For example, intravenous gene therapy programs in patients with DMD using doses of 2E14-3E14 vg/kg have been associated with acute inflammation and transient kidney dysfunction resulting in intermittent clinical holds from the FDA. Another high dose intravenous gene therapy program utilizing a conventional AAV vector, for patients with X-linked myotubular myopathy, resulted in serious adverse events including three patient deaths.
4. **Neutralization by pre-existing antibodies:** The human immune system has evolved to fight viruses, including conventional AAVs which are present in nature. Widespread exposure to these conventional AAVs has resulted in neutralizing antibodies in approximately 30% to 70% of the population depending on the vector serotype and patient population. These antibodies to conventional AAV vectors can limit gene therapy efficacy and the addressable patient population. In addition, re-dosing with the same conventional AAV vector is generally not feasible given the induction of neutralizing antibodies to the vector.

Our Solution: Evolved Vectors for Targeted Gene Therapy

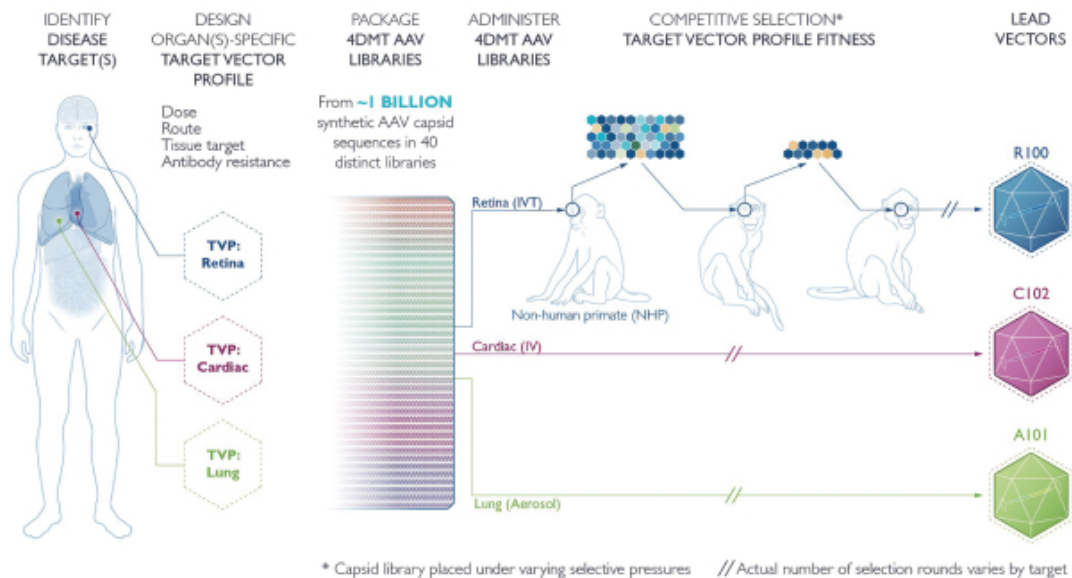
We are pioneering the development of targeted gene therapies based on our targeted and evolved vectors. Using our Therapeutic Vector Evolution platform, we invent targeted and evolved vectors that are designed to address specific diseases and their associated tissue(s). We believe our proprietary vectors will allow us to overcome known limitations of conventional AAV vectors, and to potentially address a broad range of both rare and large patient populations that cannot be addressed with conventional vectors. Based on our Target Vector Profile for a set of diseases, we select vectors in NHPs from our 40 distinct libraries made up of approximately one billion synthetic capsid sequences. Subsequently, we characterize and evaluate a lead targeted and evolved vector for delivery and transgene expression through extensive studies in NHP and human cell and organotypic tissue assays.

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The first step in directed evolution is to generate massive genetic diversity. Starting with the genomes of multiple naturally occurring AAV variants, and their ancestral predecessors, we employ numerous molecular biology techniques to create our 40 distinct libraries comprising approximately one billion synthetic capsid sequences.



Starting with our 40 distinct libraries comprising approximately one billion synthetic capsid sequences, we conduct Therapeutic Vector Evolution, including competitive selection, to identify targeted and evolved vectors that fit a Target Vector Profile. The illustration below highlights the Target Vector Profile design and subsequent selection process whereby competitive pressure is applied over a varying number of selection rounds for each program. Capsids with the best fitness for the Target Vector Profile are enriched at each round and are designated lead vectors.



Key Design Features of Our Targeted and Evolved Vectors

Through our proprietary Therapeutic Vector Evolution platform, we invent targeted and evolved vectors that we believe have the potential to display superiority to conventional AAV vectors with respect to four key design features:

- Targeted delivery to specific tissues by routine, well-tolerated and minimally invasive routes of administration
- Improved transduction of target cell types and tissues
- Lower toxicity with reduced inflammation
- Ability to resist neutralization by pre-existing antibodies in humans

As shown below, we have generated animal proof-of-concept data in both NHP and knock-out mouse disease models *in vivo*, and in human cells *in vitro*, that we believe provide evidence regarding the potential for our targeted and evolved vectors to show superiority over conventional AAV vectors. Our goal is to develop products that are safer, more efficacious, administered at lower doses, more efficiently manufactured, and, if approved, more effectively commercialized.

Targeted Delivery to, and Transduction of, Specific Tissues by Routine Clinical Routes of Administration

We select targeted and evolved vectors that are administered through what we believe to be the optimal method of delivery for a particular disease, with the goal of circumventing physical barriers en route to specific tissues or cell types in the body.

In our first example of targeted delivery in NHPs *in vivo*, our targeted and evolved vector for the retina, R100, was invented for intravitreal administration. We believe intravitreal injection is the optimal route of gene therapy administration for the retina, as evidenced by widespread use of approved intravitreally administered biologics, that generate over \$9.7 billion in annual global sales for the treatment of wet AMD, diabetic retinopathy and related diseases. The R100 vector is leveraged in modular fashion for use in all four of our current ophthalmology product candidates: 4D-110, 4D-125, 4D-135 and 4D-150. Conventional AAV capsid vectors such as AAV2 are not able to reach retinal cells effectively following intravitreal injection due to barriers such as the inner-limiting membrane barrier between the vitreous and target retinal cells. As a result, gene therapies utilizing conventional vectors have relied on delivery by subretinal surgery. This is a complex procedure that requires highly-specialized retinal surgeons to perform surgery in an operating room setting, and results in a bleb of fluid within a detached area of retina that comprises less than 1% of the total retina surface, based on published data. Potential complications include retinal tears and retinal detachments.

In contrast, in preclinical studies intravitreal R100 transduced the entire retinal surface area and a high percentage of cells in all layers of the retina, including photoreceptors and retinal pigment epithelial (RPE) cells in NHP. Of note, the ocular anatomy and physiology in NHPs closely mirrors that of humans. We therefore believe our products designed and engineered with R100 have potential tolerability, biologic activity and commercial advantages compared with product candidates that require subretinal surgical injection.

Structure-function studies suggested that the potential of R100 to penetrate through the inner-limiting membrane barrier may be associated with reduced binding to heparan sulfate, which is a major component of the barrier. R100 subsequently binds and transduces target retinal cells at higher efficiency than the conventional AAV2 vector. The improved transduction was associated with enhanced binding to sialic acid on the target cells.

Target Vector Profile for R100 intravitreal delivery to the retina:

Following intravitreal injection, conventional AAV vectors (top panel) such as AAV2 are not able to reach retinal cells effectively due to barriers such as the inner-limiting membrane barrier between the vitreous and target retinal cells. R100 administered by intravitreal injection (bottom panel) was able to penetrate through these barriers to transduce the entire retinal surface area when administered to NHP. A high percentage of cells was subsequently transduced in all layers of the retina, including photoreceptors and retinal pigment epithelial (RPE) cells. Structure-function studies suggest that the potential of R100 to penetrate through barriers such as the inner-limiting membrane barrier was associated with reduced binding to heparan sulfate. R100 subsequently bound and transduced target retinal cells at higher efficiency than the conventional AAV2 capsid. This improved transduction was associated with enhanced binding to sialic acid on the target cells.

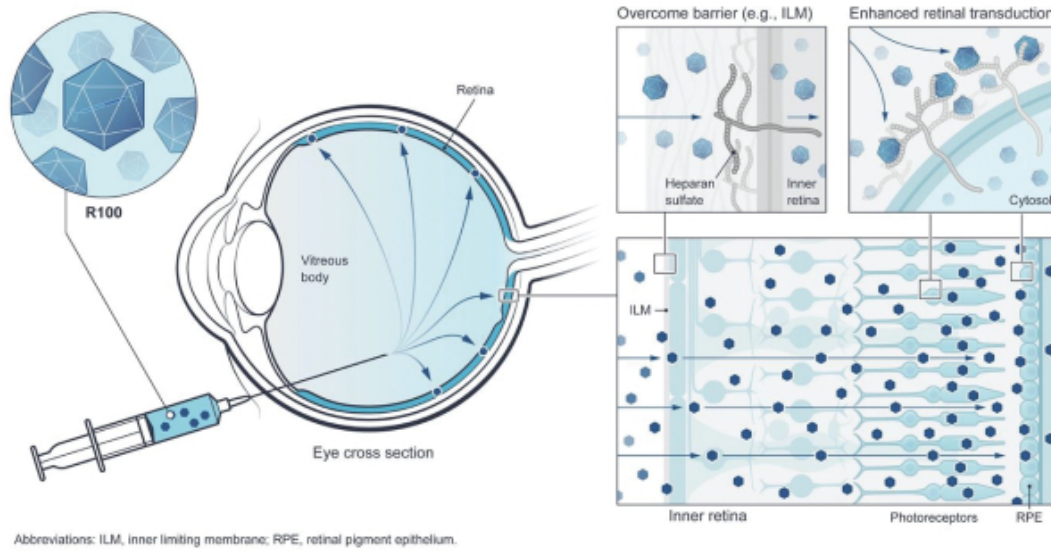
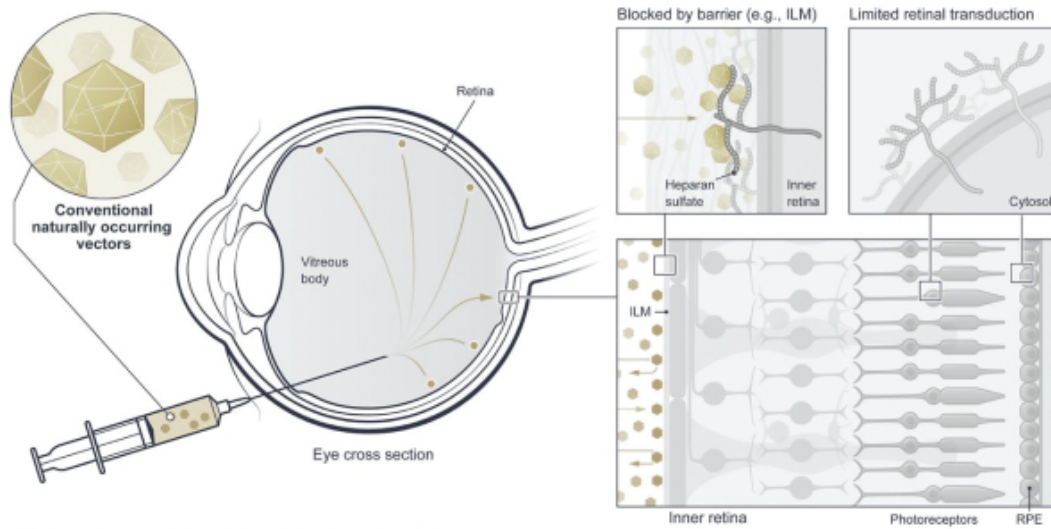
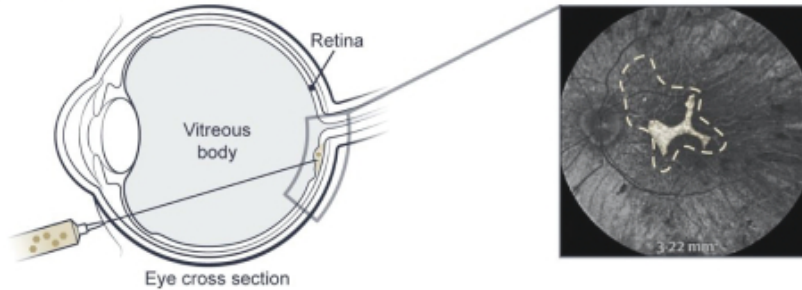


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The subretinal surgical injection route of administration with conventional AAV vectors resulted in delivery to a limited bleb area of the retina (top panel, dotted line), leaving the vast majority of the retina untreated; according to published data bleb coverage was <1% of the retina with subretinal injection. Within this bleb, viable retinal cells were transduced (top panel, colored area). The intravitreal route of administration with conventional vector AAV2 resulted in a small area of transduction around the fovea due to interference across the retina by the inner limiting membrane (ILM) (center panel, colored ring). By contrast, intravitreal injection route of administration with our targeted and evolved vector, R100, resulted in transduction across the entire surface area of the retina, including the major cell layers of the retina (bottom panel, colored area) in NHP.

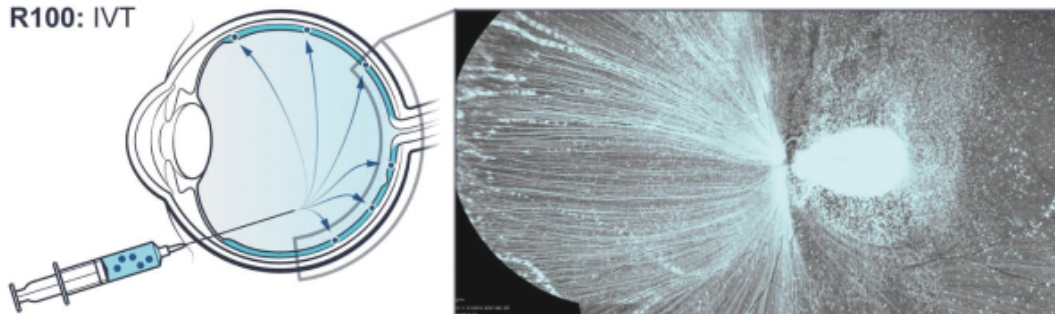
Conventional: Subretinal



Conventional: Intravitreal (IVT)

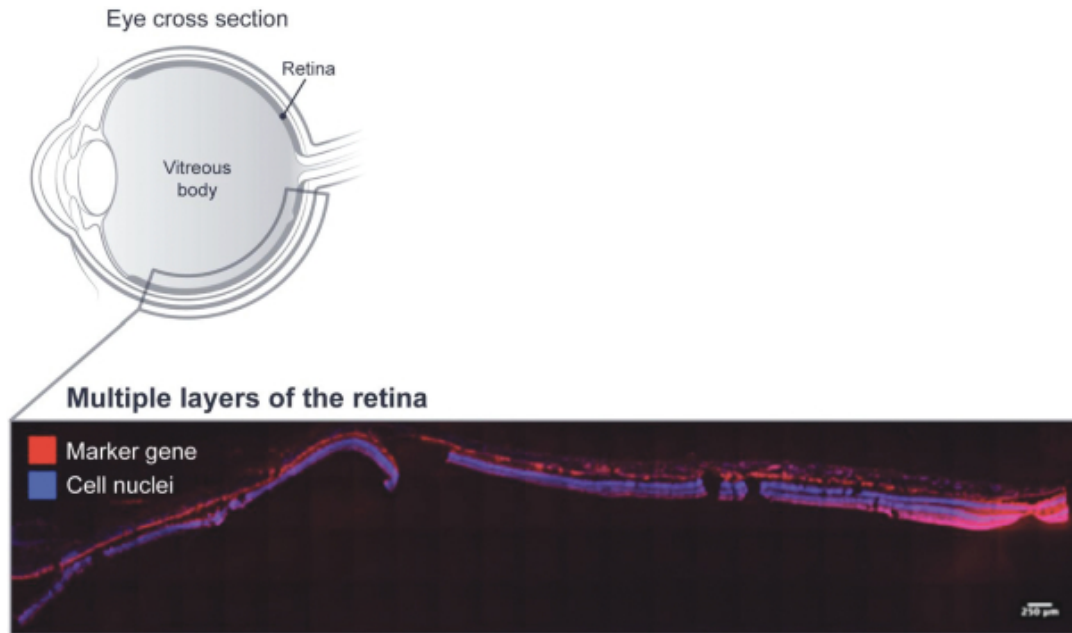


R100: IVT



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Intravitreal injection route of administration with our targeted and evolved vector, R100, resulted in transduction across the entire surface area of the retina, including the major cell layers of the retina in NHP.



R100 has been well-tolerated in both NHP and in patients. In our on-going clinical trials, we have administered two product candidates utilizing our R100 vector to patients via intravitreal injection. Treatment has been generally well-tolerated with no dose-limiting toxicities. In addition, we have administered these product candidates in 91 NHP eyes injected in three different GLP toxicology studies with no adverse findings reported.

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To date, our two clinical stage ophthalmology product candidates 4D-125 and 4D-110, both of which utilize the R100 vector, have exhibited favorable toxicity and tolerability profiles in GLP toxicology studies as summarized below.

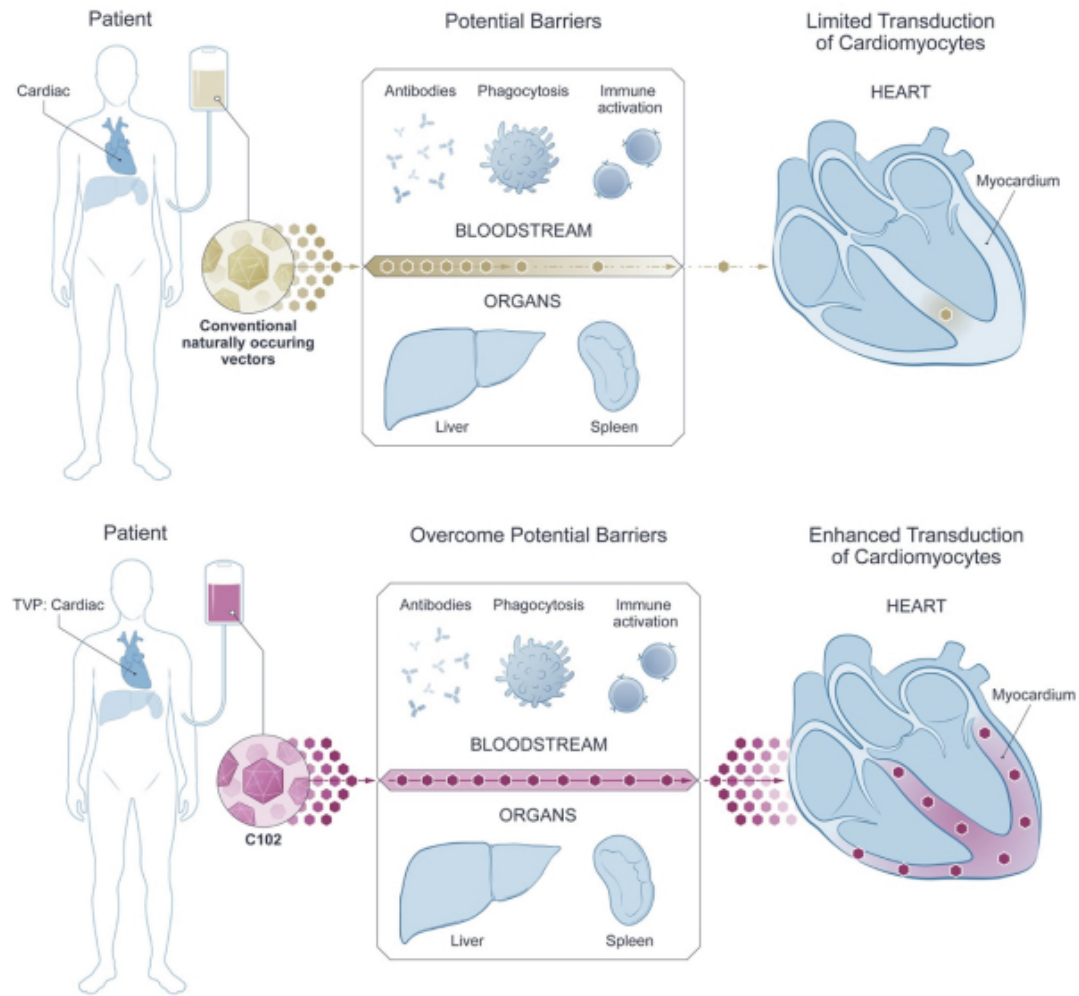
	4D-125	4D-110	
	Unilateral GLP Tox & BD	Unilateral GLP Tox & BD	Bilateral GLP Tox & BD
Species	NHP	NHP	NHP
# of eyes dosed	30	27	34
Route of administration	IVT	IVT	IVT
Highest dose to date	1E12 vg/eye	1E12 vg/eye	1E12 vg/eye
Clinical evaluation	No adverse findings; transient, steroid-responsive uveitis		
Clinical pathology	No adverse findings	No adverse findings	No adverse findings
Hematology	No adverse findings	No adverse findings	No adverse findings
Hematocrit	No adverse findings	No adverse findings	No adverse findings
Clinical chemistry	No adverse findings	No adverse findings	No adverse findings
Liver enzymes (ALT/AST)	No adverse findings	No adverse findings	No adverse findings
Gross pathology	No adverse findings	No adverse findings	No adverse findings
Histopathology	No adverse findings	No adverse findings	No adverse findings
Cellular immune response	ELISpot anti-capsid: Negative; ELISpot transgene: Negative		

Abbreviations: AE, adverse events; ALT, Alanine transaminase; AST, aspartate aminotransferase; BD, biodistribution; GLP, good laboratory practices; IVT, intravitreal; N/A = not yet available, study ongoing.

In our second example of targeted delivery in NHPs *in vivo*, our targeted and evolved vector, C102, was invented for improved delivery to and transduction of cardiac muscle tissues (cardiomyocytes), when administered by IV at low doses, with minimal inflammation. Barriers to IV delivery to heart muscle may include organs such as the liver and blood components including complement, immune cells and antibodies.

Target Vector Profile for C102 intravenous delivery to the heart:

Conventional AAV capsid vectors (top panel) such as AAV8 do not effectively deliver to heart muscle tissue following low dose IV administration. Potential barriers include clearance by organs such as the liver, and blood components including complement, immune cells and antibodies. Conversely, IV administered C102 (bottom panel) has exhibited robust delivery and broad transduction of cardiac tissues, including cardiomyocytes.

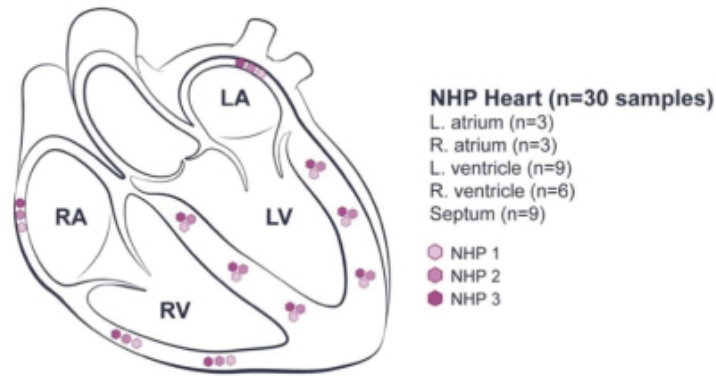


Abbreviation: TVP, Target Vector Profile.

In NHPs, we observed that intravenous delivery of C102 at relatively low doses for delivery to muscles ($1E13 - 5E13$ vg/kg) resulted in genome delivery to 100% of the 30 heart tissue samples evaluated through all regions of the heart in NHP. Transgene protein expression was detected in 29 of the 30 samples, providing evidence of intracellular protein production in cardiomyocytes.

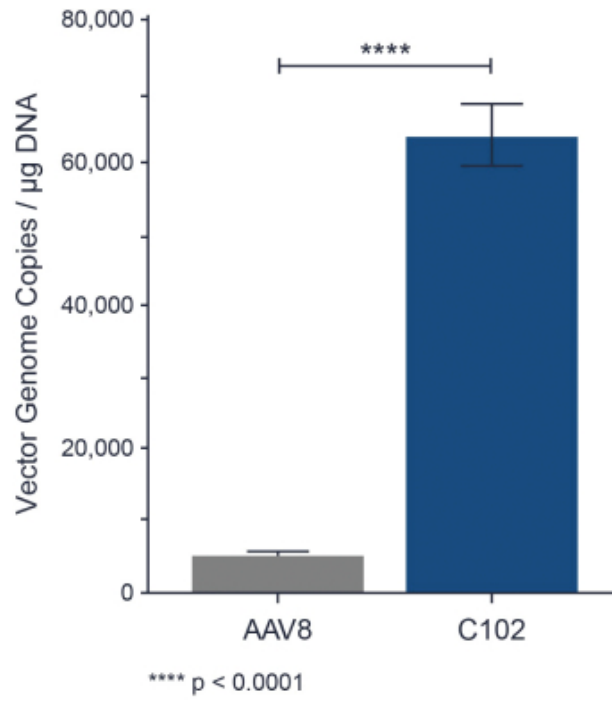
C102 delivery to, and transduction of, NHP cardiomyocytes:

The figure below illustrates the broad distribution of samples collected in our C102 biodistribution study. Samples were collected from 10 locations across the four regions of the heart in 3 NHPs. Intravenous delivery of C102 at relatively low doses ($1E13$ vg/kg) resulted in genome delivery to 100%, and protein expression in 97%, of the 30 heart tissues evaluated.



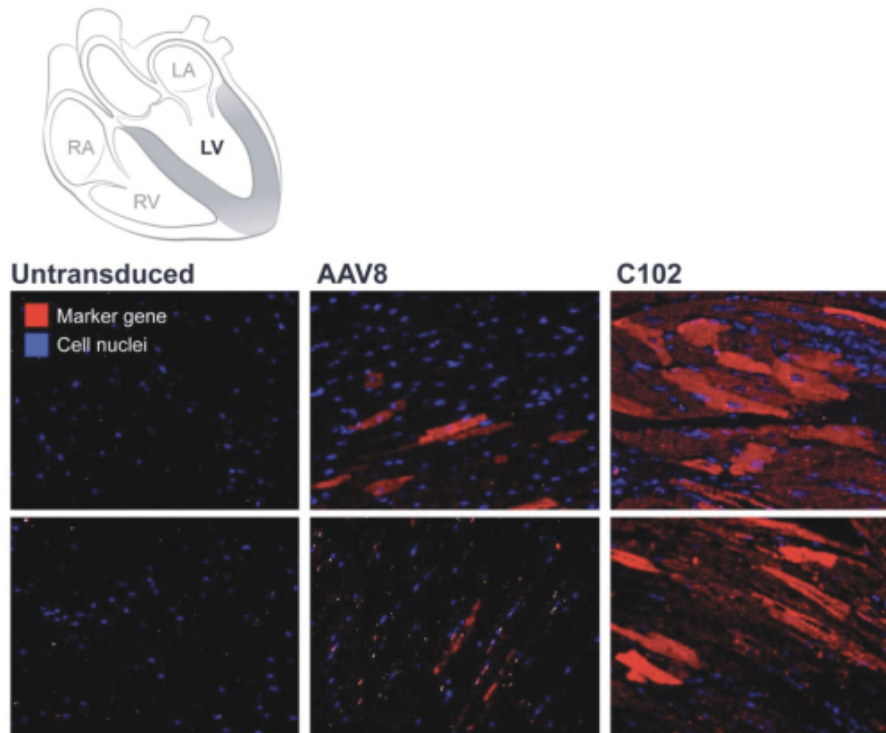
Immunohistochemistry for marker transgene protein expression showed widespread gene expression in cardiomyocytes in a preclinical study. In addition, in a preclinical study we observed that C102 was more efficiently delivered to cardiac tissues than conventional vectors such as AAV8 (shown below) and AAV9. C102 targeted the heart muscle tissue more efficiently than AAV8, and showed a 12-fold improvement in genome delivery to the heart muscle tissue. We have not compared C102 to AAV8 or AAV9 in patients in clinical studies.

*C102 delivered genetic payloads to cardiac tissue more efficiently than conventional AAV vectors in NHP:
In vector characterization studies in NHP, C102 delivered 12-fold more EGFP marker gene to cardiac tissue on average than did AAV8*



Cardiac muscle tissue transduction and protein expression in NHP heart:

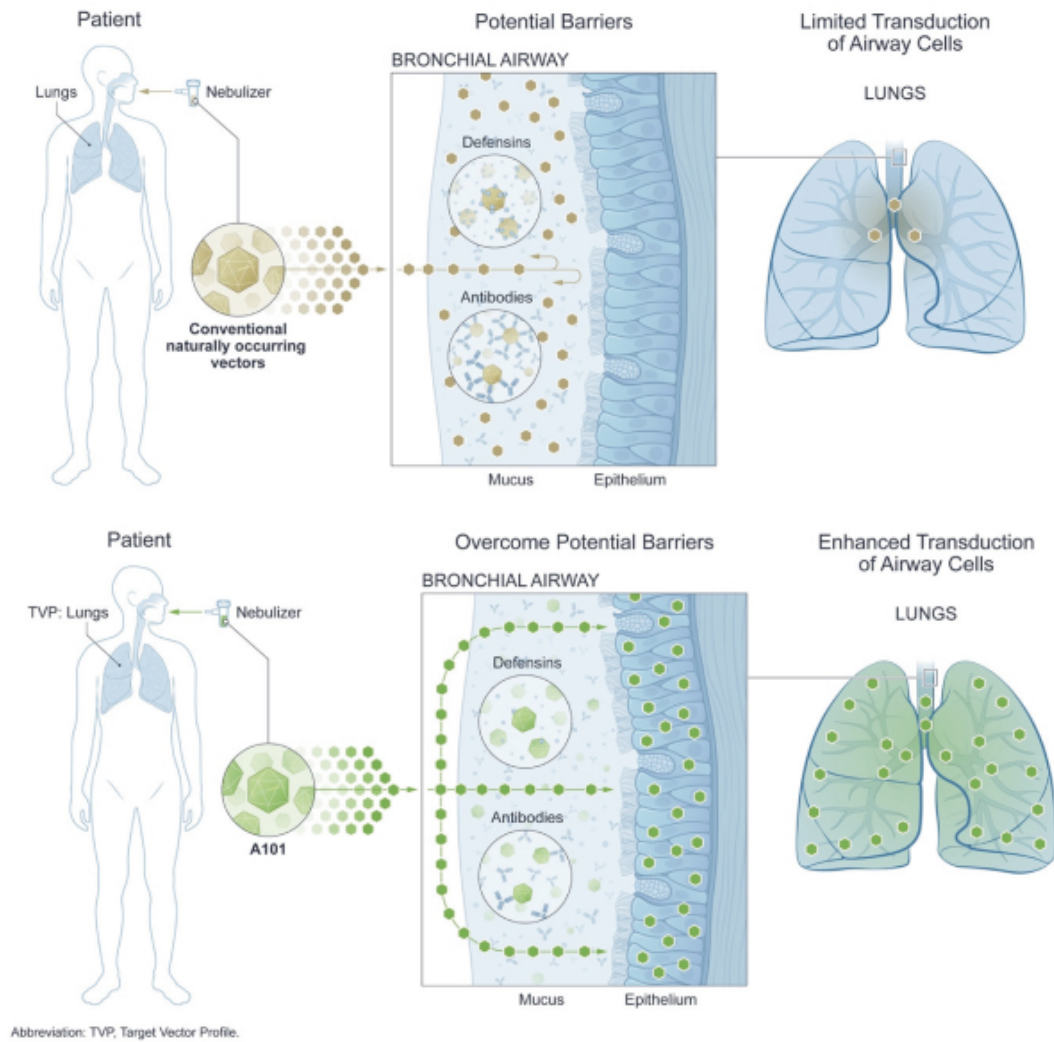
NHP cardiomyocyte transduction and marker transgene expression (EGFP) was detected by immunofluorescence 8 weeks after intravenous injection of C102 (right panel), whereas conventional vector AAV8 transduced cardiomyocytes to a lesser extent than did C102 (center panel). Non-transduced control NHP heart did not exhibit visible EGFP staining (left panel) (L, left; R, right, V, ventricle; A, atrium)



In our third example of targeted delivery in NHPs *in vivo*, our targeted and evolved AAV vector for lung tissues, A101, was invented for aerosol delivery to lung airway and alveolar cells. This vector was selected for penetration through the mucus and other potential barriers, and for resistance to pre-existing antibodies in humans. A101 is used as the targeted and evolved vector in 4D-710, our product candidate for patients with cystic fibrosis lung disease.

Target Vector Profile for A101 aerosol delivery to lung airway and alveoli:

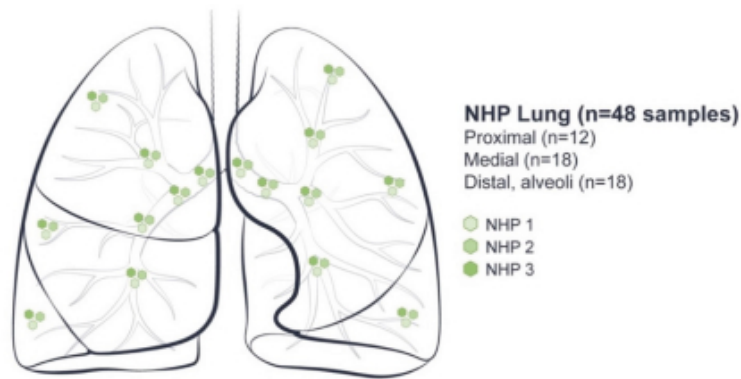
Conventional AAV capsid vectors such as AAV2 (top panel) are not able to reach lung tissue effectively following aerosol administration, due to mucus and other potential barriers including antibodies and components of innate immunity. Conversely, aerosol administered A101 (bottom panel) is designed for robust and broad transduction of lung cells, including trachea, bronchi and alveoli.



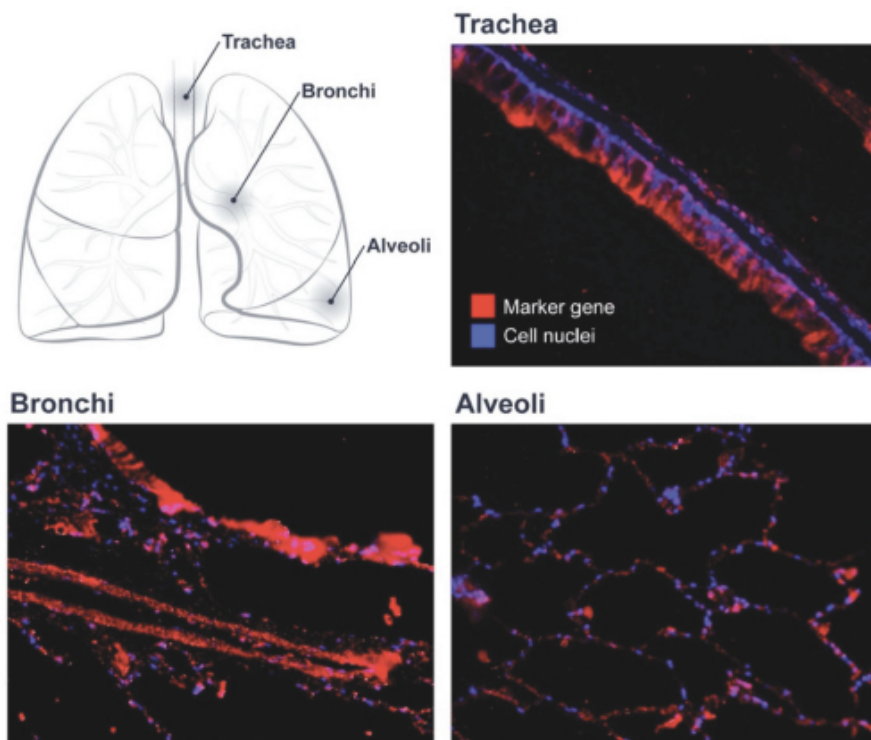
In NHPs, we observed that aerosol delivery of A101 via a standard nebulization device, approved for use in humans, resulted in genome delivery to, and GFP marker gene expression and transduction of, 100% of the 48 lung sites evaluated. We evaluated proximal and medial airways and alveoli in the lung. In addition to efficient lung tissue transduction, we also observed distribution to organs outside the lung was minimal. Genomes in tissues outside the lung were either undetectable or in extremely low concentrations (less than 0.1% of the average genomes per microgram of DNA in the lung tissues) as shown below. This data confirms the efficient protein production throughout all major regions of the lung with minimal biodistribution to the rest of the body.

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The figure below illustrates the broad distribution of samples in NHPs collected in our A101 biodistribution study. Samples were collected from 16 locations in the three regions of the lung in 3 NHPs. Aerosol delivery of A101 at a dose of $1E13$ vg resulted in genome delivery to, and protein expression in, 100% of the 48 lung tissues evaluated.

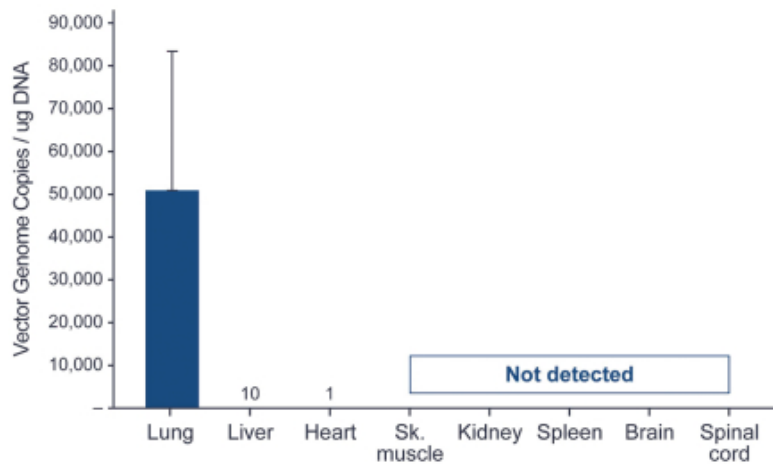


Aerosol delivery of A101 carrying the EGFP transgene in NHPs was associated with EGFP protein detection (red) by immunofluorescence in proximal (trachea) and medial (bronchi) airway and alveoli.



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Aerosol delivery of A101 in NHPs resulted in high levels of genome localization as exhibited in the chart below. A101 genome localization was limited in liver and heart, and not present in other tissues outside the lung. EGFP marker protein expression was also detected in all lung samples.

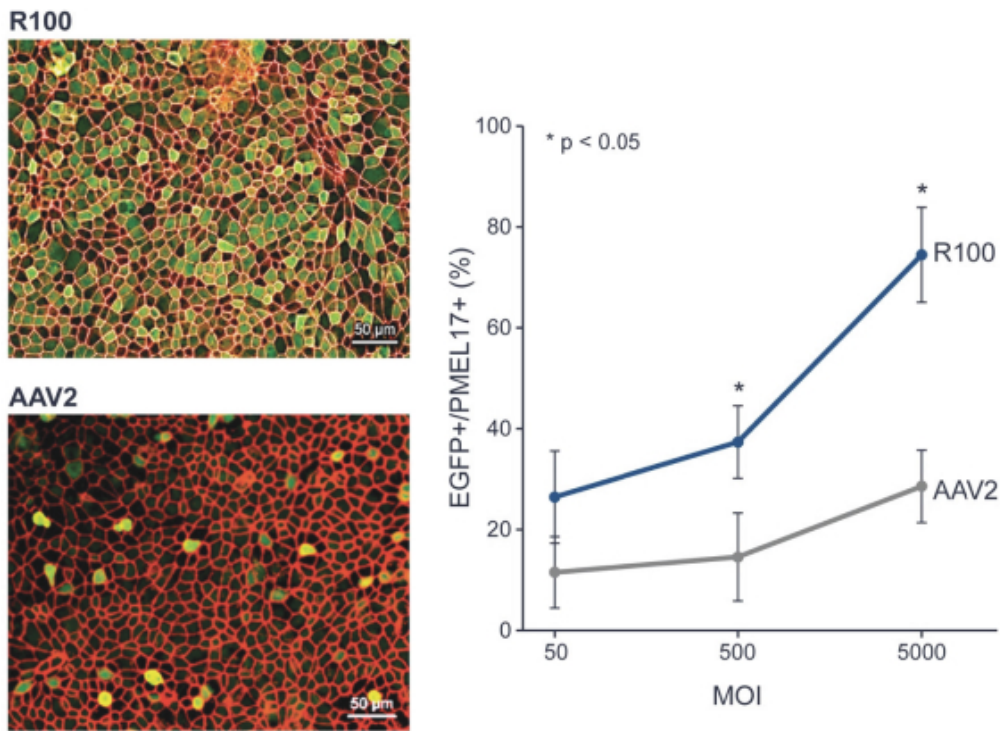


Potential for Improved Transduction and Transgene Expression in Target Human Cell Types and Tissues

We invent targeted and evolved vectors for a specific set of diseases to fit a defined Target Vector Profile, in an effort to generate higher levels of transgene expression than conventional AAV vectors.

In our first example of improved target tissue transduction leading to higher levels of expression and more cells transduced, we observed superior transduction with R100, our intravitreally administered targeted and evolved vector. R100 was significantly more efficient than AAV2 at transducing human retina cells *in vitro*, such as RPE cells below. These *in vitro* studies comparing R100 to AAV2 helped to inform our decision to move the vector forward and to develop R100-based product candidates. We have not conducted any clinical studies in patients comparing AAV2 to R100. AAV2 is the conventional vector most commonly used for retina treatment in humans. R100 is leveraged in modular fashion for use in all of our ophthalmology product candidates, including 4D-110, 4D-125, 4D-135 and 4D-150.

R100 exhibited significantly higher transduction of stem cell derived human retinal pigment epithelial cells in vitro compared to conventional AAV2 across a broad range of concentrations. R100 transduced a higher percentage of cells than AAV2, and marker transgene expression was superior to AAV2



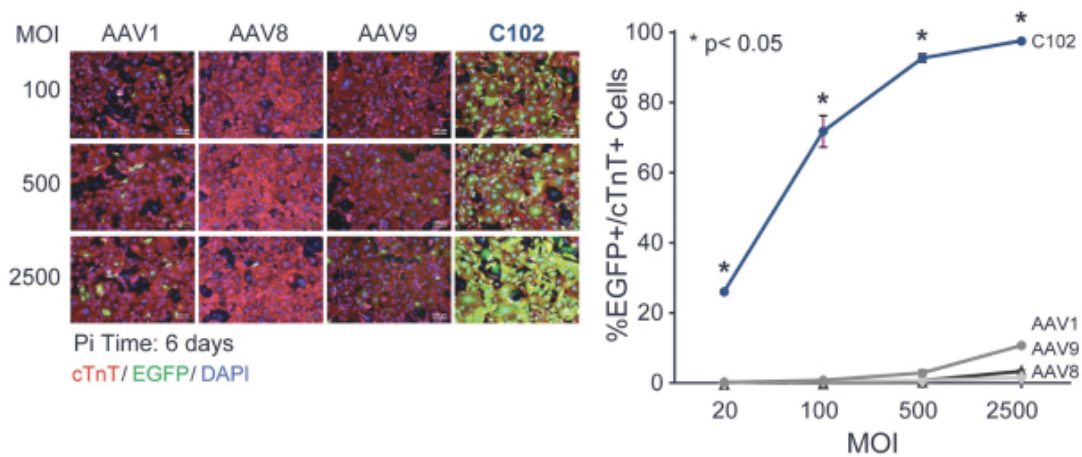
PMEL17 = premelanosome protein, a marker of retinal pigmented epithelial cell identity

%EGFP+/PMEL17+ Cells = the percentage of EGFP-expressing cells within the PMEL17-expressing retinal pigmented epithelia population, a quantification of the transduction efficiency of the capsid for the target cell type

MOI = multiplicity of infection, a description of dose (vg per cell) for in vitro experiments

In our second example of improved transduction versus conventional AAV vectors, our targeted and evolved vector C102 was invented to efficiently target human heart muscle cells (cardiomyocytes); C102 is used in 4D-310 for Fabry disease. Conventional AAV vectors AAV1, AAV8 and AAV9 have been used by competitors to target heart muscle cells; however, we believe limited transduction with these conventional AAV vectors may limit efficacy and lead to high dose requirements that may present safety challenges. In preclinical studies, C102 exhibited significantly improved transduction of human cardiomyocytes (ventricular phenotype) compared to conventional AAV vectors across a wide range of concentrations, as shown below. These in vitro studies comparing C102 to AAV1, AAV8 and AAV9 helped to inform our decision to move the vector forward and to develop C102-based product candidates. We have not conducted any clinical studies in patients comparing conventional vectors to C102.

C102 exhibited significantly higher transduction in vitro relative to conventional AAV1, AAV8 and AAV9, in human cardiomyocytes of ventricular phenotype. C102 transduced a higher percentage of cells than conventional AAV, and marker transgene expression was superior to conventional AAV



cTnT = cardiac troponin T, a marker of cardiomyocyte cell identity

DAPI = a marker of cell nuclei

MOI = multiplicity of infection, a description of dose (vg per cell) for in vitro experiments

%EGFP+/cTnT+ Cells = the percentage of EGFP-expressing cells within the cTnT-expressing cardiomyocyte population, a quantification of the transduction efficiency of the capsid for the target cell type

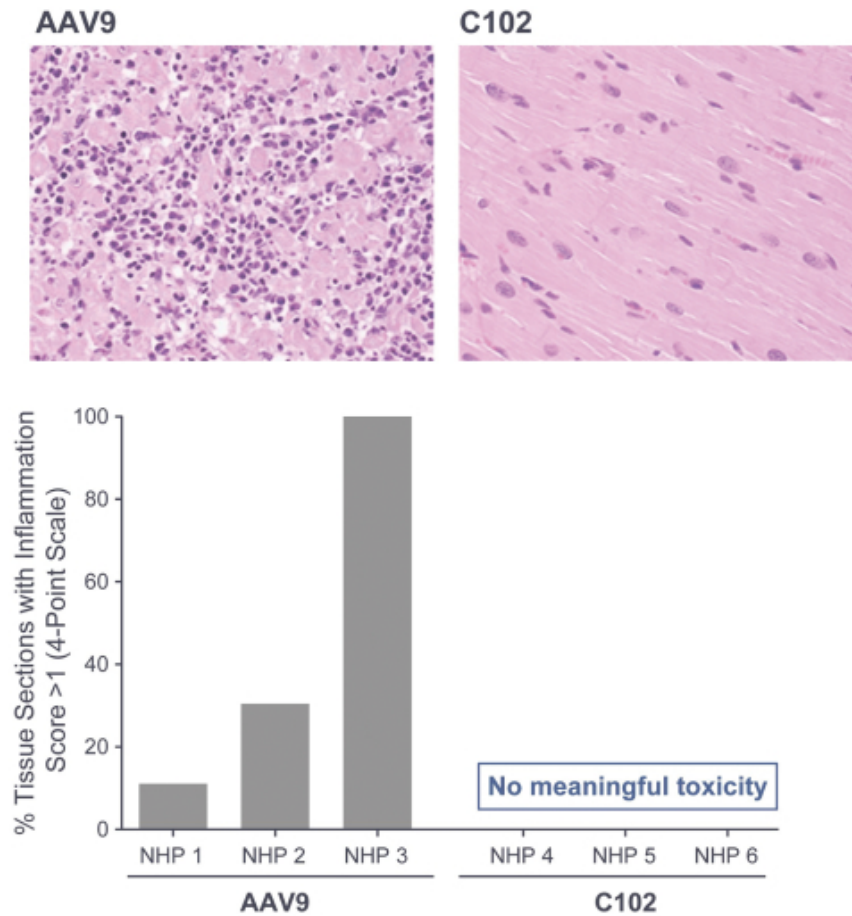
Potential for Low Toxicity with Reduced Inflammation Profile

We believe that targeted and evolved vectors invented via Therapeutic Vector Evolution have the potential to cause less inflammation, require lower doses and lead to a lower overall toxicity profile versus conventional AAV vectors such as AAV8 and AAV9. As others have reported, high IV doses with AAV9-based gene therapies in humans and NHPs have been associated with toxicity and inflammation in heart, kidney, liver and neural tissues. Others have also reported that high dose IV treatments with a product candidate incorporating AAV8 have, tragically, resulted in three patient deaths in a clinical trial for X-linked myotubular myopathy.

As illustrated below, in contrast to AAV9, our targeted and evolved vector C102 (used in 4D-310 for Fabry disease) was not associated with significant inflammation or toxicities in NHP heart tissues after IV administration. AAV9 was associated with inflammation and damage in heart tissue as shown on histology and blood tests shown below. These in vivo studies comparing C102 to AAV9 helped to inform our decision to move the vector forward and to develop C102-based product candidates. We have not conducted any clinical studies in patients comparing AAV9 to C102.

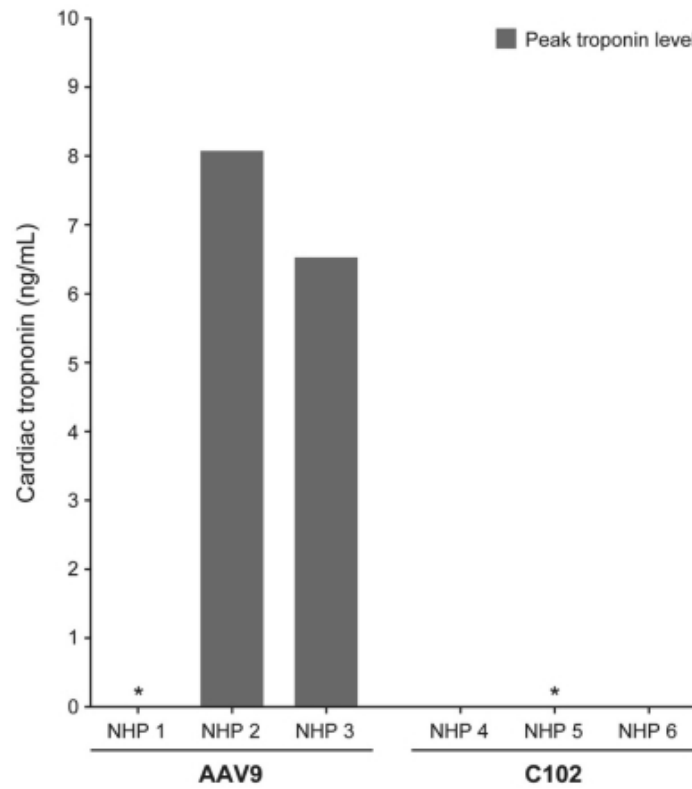
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After dosing of NHPs with IV C102, no meaningful heart inflammation or toxicity was observed, in contrast to meaningful heart inflammation and necrosis observed in NHPs receiving AAV9, as illustrated in the H&E staining below. Immune cell infiltrate (dark purple) and cardiomyocyte death (rounded formation of cardiomyocytes in pink) associated with AAV9 are highlighted in the left image below. Lack of similar infiltrate associated with C102 is highlighted in the right image below (no dark purple, elongated cardiomyocytes in pink with magenta cell nuclei). Quantification of the full histological analysis provided by an independent veterinary pathologist is included below these images. Of note, the two vectors carried the same CAG promoter and EGFP transgene payload, were packaged and purified using the same process, were quantified using the same assay, and administered in identical fashion at the same contract research organization (CRO).



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After dosing of NHPs with IV C102, no meaningful cardiac troponin release into the blood was observed, in contrast to meaningful elevations in cardiac troponin observed in NHPs receiving AAV9. Of note, the two vectors carried the same CAG promoter and EGFP transgene payload, were packaged and purified using the same process, were quantified using the same assay, and administered in identical fashion at the same CRO.



* Peak cardiac troponin levels for both NHP 1 and NHP 5 were detectable within the normal range (0.04 ng/mL)

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Overall, our three lead targeted and evolved vectors, R100, C102 and A101, have exhibited favorable tolerability results in NHPs and mice in toxicology studies across our lead product candidate development programs, as summarized below.

	4D-310 GLP Tox	4D-310 Tox & BD	4D-710 Tox & BD	4D-125 Unilateral GLP Tox & BD	4D-110 Unilateral GLP Tox & BD	4D-110 Bilateral GLP Tox & BD
Species	Mouse	NHP	NHP	NHP	NHP	NHP
# dosed	132	9	6	30 eyes	27 eyes	34 eyes
Route of administration	IV	IV	Aerosol	IVT	IVT	IVT
NOAEL	1.5E14 vg/kg	5E13 vg/kg	3E13 vg	1E12 vg/eye	1E12 vg/eye	1E12 vg/eye
Clinical evaluation	No adverse findings	No adverse findings	No adverse findings	No adverse findings; Transient, steroid-responsive uveitis		
Clinical pathology	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Hematology	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Hematocrit	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Clinical chemistry	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Liver enzymes (ALT/AST)	No adverse findings	No adverse findings ^a	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Gross pathology	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Histopathology	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings	No adverse findings
Cellular immune response	N/A	N/A	BAL: No immune infiltration	ELISpot anti-capsid: Negative; ELISpot transgene: Negative		

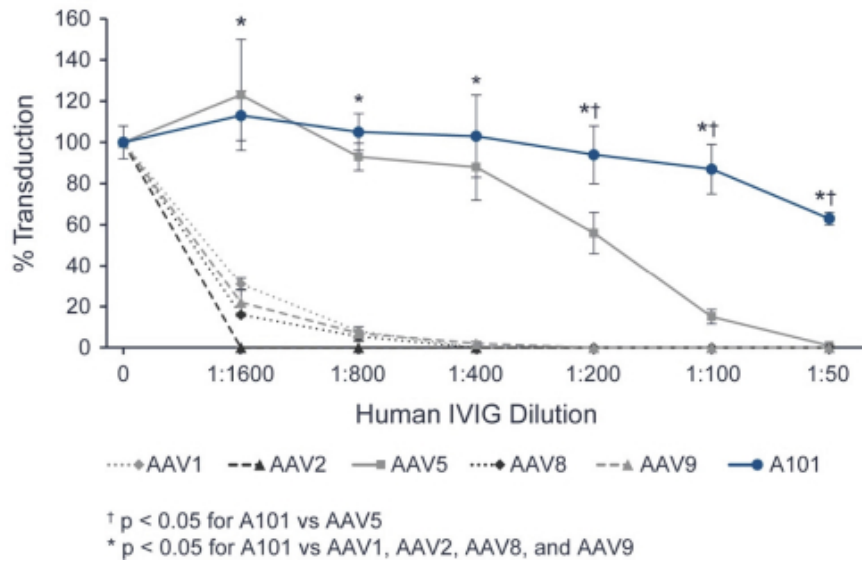
Abbreviations: AE, adverse events; ALT, Alanine transaminase; AST, aspartate aminotransferase; BD, biodistribution; GLP, good laboratory practices; IV, intravenous; IVT, intravitreal; N/A = not yet available, study ongoing; NOAEL, no-observed-adverse-effect-level.

Potential to Resist Inhibition by Pre-Existing Neutralizing Antibodies from Humans: Potential for Re-Dosing and Treating Larger Patient Populations

We have invented targeted and evolved vectors for resistance to inhibition by pre-existing neutralizing antibodies in the human population. We believe that vectors invented in this fashion may broaden our potential addressable patient population compared to conventional AAV vectors. We believe that enhanced resistance to antibodies may result in less neutralization, and therefore potentially better efficacy, after patient treatment. Finally, we believe we have the potential to re-dose patients after receiving other AAV gene therapies, and when desirable by developing product candidates with different targeted and evolved vectors that target the same tissues. This approach would utilize a vector whose antibodies do not cross-react with the vector used in the preceding AAV gene therapy treatment.

For example, the Target Vector Profile for our targeted and evolved vector A101 included aerosol delivery and resistance to antibodies in humans; A101 is used in 4D-710 for cystic fibrosis. As shown below, we observed that A101 had significantly greater antibody resistance than conventional AAV1, AAV2, AAV5, AAV8 and AAV9. These in vitro studies comparing A101 to conventional vectors helped to inform our decision to move the vector forward and to develop A101-based product candidates. We have not performed any clinical studies in patients comparing conventional vectors to A101.

A101 exhibited superior resistance to human antibodies (present in human IVIG) *in vitro* compared to conventional AAV vectors AAV1, AAV2, AAV5, AAV8 and AAV9 as measured by transduction percentage.



Our Proprietary Therapeutic Vector Evolution Platform

Our proprietary Therapeutic Vector Evolution platform is based on the principles of directed evolution. Directed evolution is a high-throughput platform approach that harnesses the power of evolution in order to create biologics with new and desirable characteristics.

The first step of directed evolution involves the generation of massively diverse libraries of biological variants. In the second step, a target profile is designed with desired biological characteristics. In the final step, selective pressures are applied to these libraries forcing competition to select for improved variants with the desired biological characteristics. This method has been successfully utilized by other researchers to generate protein therapeutics with enhanced biological activities, antibodies with enhanced binding affinity and enzymes with new specificities. The importance of this biotechnology was demonstrated when the Nobel Prize for Chemistry was awarded in 2018 for work on directed evolution of proteins, antibodies and enzymes performed by academic investigators including Dr. Frances H. Arnold at Caltech; these investigators have no relationship to 4DMT.

Our co-founder and Chief Scientific Advisor, Dr. David Schaffer, pioneered the use of directed evolution to create improved AAV capsids for use as gene therapy vectors at U.C. Berkeley over 20 years ago. Over the past seven years, we have developed and industrialized our Therapeutic Vector Evolution platform to invent targeted and evolved vectors for use in human therapeutic products. Since in-licensing several libraries from the U.C. Berkeley and creating over 30 newer libraries at our company, we have a total of 40 diverse libraries comprising approximately one billion proprietary synthetic capsid sequences. In addition, we have developed significant experience in performing Therapeutic Vector Evolution programs in NHPs, with 14 capsid selections completed to

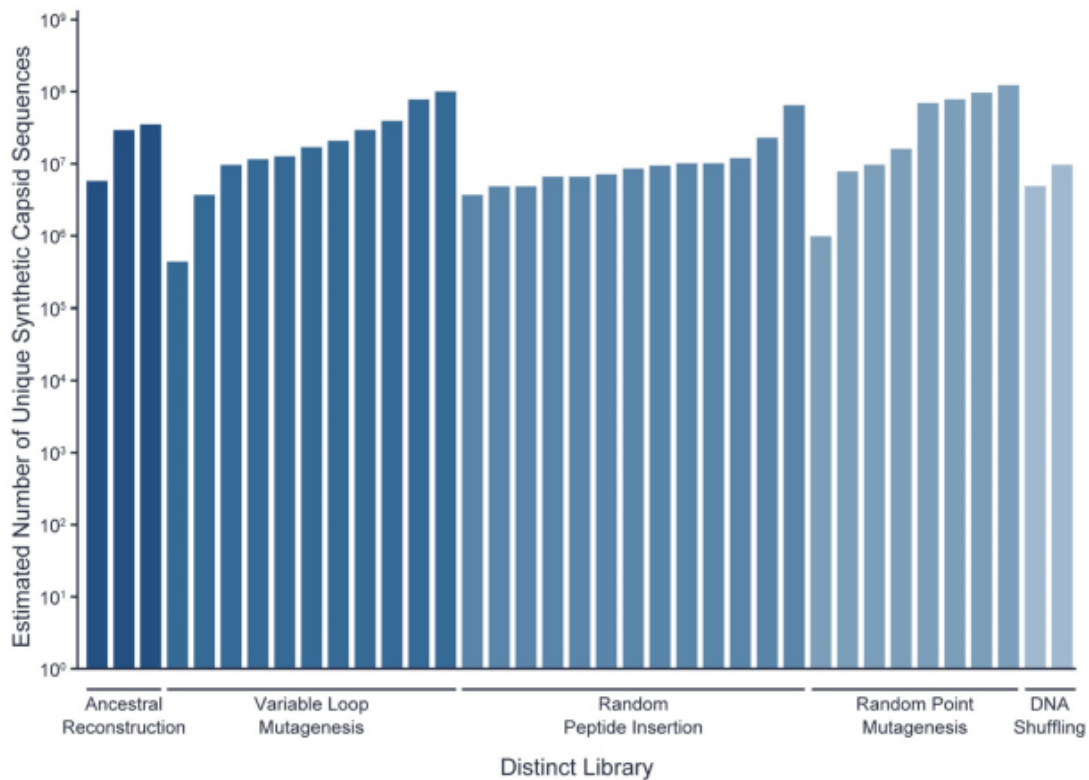
date. We believe this will help us to develop product candidates to address a broad swath of diseases in rare and large patient populations, including those other gene therapies cannot.

Diverse Libraries of Synthetic Capsid Sequences

Each library results from the application of a different genetic diversification methodology, such as variable loop mutagenesis, random peptide insertion, random point mutagenesis, DNA shuffling and ancestral reconstruction, and is also defined by its starting material (AAV capsid gene sequences). Furthermore, we apply bioinformatics, emerging technologies, and experience and know-how resulting from previous discovery programs to continually improve and expand our libraries and improve our ability to select customized targeted and evolved vectors.

We believe the size and diversity of our proprietary synthetic capsid libraries represent a differentiating competitive advantage for us in the field of gene therapy.

Our 40 distinct libraries comprise approximately one billion synthetic capsid sequences. Each library results from the application of a different genetic diversification methodology, such as variable loop mutagenesis, random peptide insertion, random point mutagenesis, DNA shuffling and ancestral reconstruction, and is also defined by its starting material (AAV capsid gene sequences). We have estimated the number of capsid sequences for 37 of these libraries as illustrated below.



The Target Vector Profile Followed by Competitive Vector Selection

We employ a rigorous approach to inventing targeted and evolved vectors based on what we consider an optimal vector and product profile, which we term the Target Vector Profile. For any set of

target diseases that affect the same tissue(s), this profile includes any combination of the following: the optimal route of administration for targeting the specific tissue(s) in humans, the optimal dose range, the desired distribution of vector transduction within the target organs, overall biodistribution and/or antibody resistance.

We use our Therapeutic Vector Evolution platform to select the “fittest” targeted and evolved capsid that best matches our Target Vector Profile. We achieve this through serial rounds of “selection”, or discovery, with each round of selection filtering down to fewer and fewer synthetic capsids from the original library. This funneling process is achieved by applying selective pressures—forcing competition—among all synthetic capsid variants in the library to achieve delivery to the target cells as defined in the Target Vector Profile. Each round is performed in a primate *in vivo*, sometimes in the presence of human antibodies.

By the end of a typical Therapeutic Vector Evolution process, we will have identified approximately two to four targeted and evolved vectors, or hits, based on their frequency in the final pool of synthetic capsid sequences, in addition to numerous sequences present at lower frequencies. We then file patent applications disclosing select identified gene sequences from the discovery program. We believe this deliberate approach to selection *in vivo* in NHPs and in human tissues should lead to identification of targeted and evolved vectors with a higher likelihood of therapeutic benefit in humans.

Vector Invention Results to Date

We have completed 14 unique vector selection programs or “selection processes” for specific proprietary synthetic capsids with specific Target Vector Profiles. Across our clinical development and discovery portfolio, we have utilized four different routes of administration, including intravenous, intravitreal, aerosol, and intrathecal administrations. We have completed discovery programs targeting a diverse array of tissue types including various retinal cell types, heart and skeletal muscle tissues, different lung cell types, liver, brain, dorsal root ganglia, and synovial joints. We have identified and filed patent applications on over 300 unique targeted and evolved vectors.

Characterization of Novel Vector Variant “Hits” and “Leads”

Vector hits are typically characterized by three major criteria: manufacturing, human cell and human organotypic model transduction, and delivery to tissues in NHPs by the designated route of administration. Vector hits may also be evaluated for transduction in the presence of human antibodies. In order to perform characterization studies, vectors are armed with marker gene payloads such as enhanced green fluorescent protein (EGFP). After these hits have been evaluated, a lead vector is selected.

Directed Evolution-Based Promoter and Transgene Discovery Platforms

To complement our Therapeutic Vector Evolution platform and modular development approach, we are generating next-generation optimized promoter elements and transgenes using a combination of directed evolution and proprietary algorithms.

Currently available promoters may lack sufficient strength of expression and selectivity for clinical benefit of AAV gene therapies. In addition, for some AAV gene therapy products a smaller promoter region may be essential for the gene payload to fit in the AAV. Therefore, we believe there is a need for better promoters for many AAV products to enable or enhance their therapeutic benefit. We generate Target Promoter Profiles for any given product and disease target. This promoter profile includes target cell specificity and strength in order to maximize tolerability and/or biologic activity, as

well as any necessary size constraints. Under one of our sponsored research agreements with U.C. Berkeley, we are working with our co-founder Dr. Schaffer to create customized and proprietary promoters for use in our pipeline products. Our libraries of novel and diverse synthetic promoters have been engineered and currently comprise approximately ten million unique sequences. Our discovery platform identifies the best promoters within the libraries for a specific Target Promoter Profile.

In addition to our synthetic promoters, we are developing next-generation optimized transgene discovery platform. Our discovery platform uses a high-throughput approach, harnessing both directed evolution and rationale design algorithms, to identify novel transgenes that express therapeutics proteins. For example, we have developed transgenes to express RNAi in target cells of interest for treatment of disease. These transgene-expressed RNAi molecules, or ddRNAi, are anchored by a microRNA backbone that not only enhances stability and limits off-target effects, but also facilitates high expression within target cells and thereby increases efficacy. Our technology allows us to powerfully knock down disease-causing transcripts, combining a design for a high degree of selectivity with the goal of long-term expression afforded by AAV-based gene therapy.

Product Pipeline

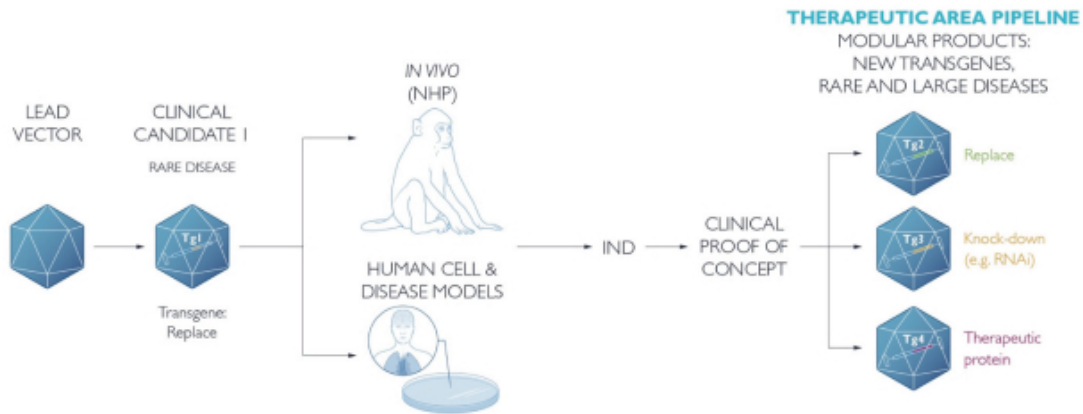
Overview

Our platform enables a broad and diverse pipeline of transformative targeted gene therapies that we are advancing through clinical trials. We currently have a product pipeline that includes targeted gene therapies in three therapeutic areas: ophthalmology, cardiology (primary or secondary to systemic diseases) and pulmonology.

For each of these therapeutic areas, we invented a targeted and evolved lead vector employing Therapeutic Vector Evolution. These lead vectors were designed for delivery by optimal and routine clinical routes to the target tissue(s). As illustrated below, our platform is designed to be modular in that an evolved vector invented for a given therapeutic area can be equipped with different transgene payloads to produce unique product candidates to treat other diseases affecting the same tissue type(s). We believe this modularity will help inform the clinical development of subsequent product candidates using the same vector.

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Lead vectors that have been invented through Therapeutic Vector Evolution are used to design and engineer product candidates for specific diseases. These product candidates are tested in NHP and in human cell & disease models prior to IND filing and entry into clinical trials. While a first product candidate utilizing one of our targeted and evolved vectors is advancing through development, we build additional product candidates to follow closely and rapidly by using the same lead vector in modular fashion.



Our pipeline includes product candidates for both rare disease and large patient populations and is represented in the chart below.

VECTOR Delivery	PRODUCT CANDIDATE	INDICATION	RESEARCH [†]	IND-ENABLING	PHASE 1	PHASE 2	PHASE 3	PRODUCT RIGHTS	
R100 Intravitreal	OPHTHALMOLOGY								
	4D-125	XLRP	[Progress bar]			Initial Data 2021			4DMT*
	4D-110	CHM	[Progress bar]			Initial Data 2022 [‡]		Roche	
	4D-150	Wet AMD	[Progress bar]			Initiate Ph 1/2 2H-2021		4DMT	
		DR/DME	[Progress bar]					4DMT	
C102 IV	CARDIOLOGY								
	4D-310	Fabry Disease	[Progress bar]			Initial Data 2021			4DMT
A101 Aerosol	PULMONOLOGY								
	4D-710	Cystic Fibrosis	[Progress bar]			Initiate Ph 1/2 2H-2021			4DMT

* 4DMT is responsible for the development of this product candidate; Roche has an exclusive option to assume development and commercialization at its sole cost and expense. Such an option may be exercised prior to pivotal trial initiation.

‡ Reporting in coordination with our partner Roche.

§ The Research stage involves (1) defining the Target Vector Profile then deploying Therapeutic Vector Evolution with our capsid libraries in non-human primates (NHPs) and using competitive selection to identify targeted and evolved vectors from our libraries that demonstrate the strongest match to the Target Vector Profile; then (2) optimizing our product candidates using the lead vector by conducting in vivo and in vitro evaluation of various transgene and promoter construct candidates in cell and animal models, and the selection of at least one product candidate to move forward into IND-enabling studies.

Ophthalmology Therapeutic Area

Introduction

We are developing product candidates to treat severe ophthalmology diseases. Our targeted and evolved vector, R100, is used in all four of our ophthalmology product candidates and was invented for routine intravitreal injection, leading to transgene expression across the entire surface area of the retina, and in the major cell layers of the retina. We believe this modularity will help inform the clinical development of subsequent product candidates using the same vector.

Our product candidate 4D-125 is enrolling patients in an ongoing Phase 1/2 dose-escalation clinical trial in patients with XLRP related to mutations in the *RPGR* gene. The primary objectives of this trial are to evaluate the safety and maximum-tolerated dose of 4D-125. Secondary endpoints include assessments of biologic activity, including both visual field function and anatomical endpoints. Six patients total have been treated and followed for up to 18 weeks to date. Three patients in cohort 1 (3E11 vg/eye) have been treated. Following independent data safety monitoring committee approval of dose escalation, three patients have been treated in cohort 2 (1E12 vg/eye, the highest dose planned). 4D-125 has been well tolerated without any dose-limiting toxicities. We expect to report initial clinical data in 2021. 4DMT currently holds the worldwide commercialization rights for 4D-125 and Roche holds an exclusive option to in-license the product prior to pivotal trial initiation.

Our product candidate, 4D-110, is enrolling patients in an ongoing Phase 1 dose-escalation clinical trial in patients with choroideremia related to mutations in the *CHM* gene. The primary objectives of this trial are to evaluate the safety and maximum-tolerated dose of 4D-110. Secondary endpoints include assessments of biologic activity, including visual acuity, visual field function and anatomical endpoints. Enrolled patients have been followed previously on our natural history study, in which we have enrolled 55 patients, and have followed 47 of these patients for at least two years. Three patients have been treated and followed for up to 21 weeks to date. The independent data safety monitoring committee approved dose escalation to the highest planned dose level. 4D-110 has been well tolerated without any dose-limiting toxicities. In coordination with our partner Roche, we expect to report initial clinical data in 2022.

We also have two wholly owned preclinical product candidates. We are developing 4D-150 for the treatment of wet AMD and diabetic retinopathy, including DME, and we expect to initiate a wet AMD clinical trial for 4D-150 in the second half of 2021. We are also developing 4D-135 for the treatment of autosomal dominant retinitis pigmentosa (adRP). We expect to initiate IND enabling studies for 4D-135 in 2021.

4D-125 for X-Linked Retinitis Pigmentosa (XLRP)

Disease Background, Unmet Medical Need and Target Patient Population

XLRP is a rare inherited X-linked recessive genetic disorder that causes progressive vision loss and blindness in boys and young men. There are currently no approved therapies for XLRP. Seventy percent of cases are caused by mutations in the retinitis pigmentosa GTPase regulator (*RPGR*) gene. The estimated worldwide prevalence of XLRP due to *RPGR* variants is approximately one in 25,600 people, which represents approximately 24,000 patients in the United States, and France, Germany, Italy, Spain and the United Kingdom (together, EU-5). It is characterized by dysfunction and degeneration of photoreceptors in the retina. Loss of *RPGR* function in retinal cells causes the progressive loss of rod and cone photoreceptors, leading to the progressive loss of vision. Symptoms of XLRP are initially characterized by night blindness, followed by loss of peripheral visual field, decreasing visual acuity and eventually blindness. While males are usually the most affected, approximately 25% of heterozygous females experience loss of vision.

Our Solution

We are developing 4D-125 for the treatment of patients with XLRP with *RPGR* mutations. 4D-125 is designed to benefit patients at all stages of XLRP, including early stage patients whose entire viable retinas are not adequately treated by subretinal surgery. This product candidate is comprised of R100 and carries a codon-optimized *RPGR* transgene engineered for expression within human photoreceptors. In NHP models, we have observed widespread transduction and transgene expression across the entire retinal surface. We believe that 4D-125 has the potential to successfully treat XLRP patients at the earliest stages of their disease progression and ideally, slow or prevent progression and retain vision.

Competition and Differentiation: AAV Gene Therapy for XLRP

Several companies are developing subretinal AAV gene therapies for patients with XLRP. Subretinal administration results in transduction and direct treatment of only a small fraction of the retina. On Phase 1 and 2 trials, investigators have reported improvements in visual field function within the localized retina area receiving the treatment bleb in a subset of patients. These AAV gene therapies require invasive subretinal surgery, which has been associated with subretinal surgery-related adverse events. In addition, subretinal surgery results in transduction of only a small fraction of the retina and is therefore limited to patients with more advanced disease with a small remaining area of viable retinal cells.

We believe 4D-125 has the potential to be differentiated from other AAV gene therapies in clinical development, to our knowledge, on the basis of four design features:

1. **Safe and routine intravitreal route of administration:** Product candidates that utilize conventional AAV vectors such as AAV2, must be administered by subretinal surgery for XLRP. Unlike those product candidates, R100, which is included in our product candidate 4D-125, was specifically invented for intravitreal injection. Notwithstanding any potential design features of 4D-125, this easier and widely used route of administration should result in safer and faster clinical trial enrollment, better efficacy and faster market uptake.
2. **Treatment of the entire retinal surface:** Unlike conventional AAV vectors administered by subretinal surgery, which reportedly treat only a small fraction of the retinal surface, 4D-125 can be used to treat the entire retinal surface following intravitreal injection, potentially broadening its therapeutic applicability.
3. **Feasibility of treating early stage patients:** We believe it will be feasible to safely treat early stage patients before they start to lose their retina. 4D-125 is designed to treat the entire surface of the retina, including the periphery where degenerative diseases like XLRP start. In addition, intravitreal injection is recognized as a safe, simple and routinely used method of administering therapeutics.
4. **Commercial opportunity:** Intravitreal injections are widely adopted by many practicing ophthalmologists and used to treat a number of ophthalmological indications. As a result, we believe 4D-125 has the potential for rapid market uptake, if approved.

Preclinical Animal Model Pharmacology and Toxicology Studies

We completed a single dose IND-enabling toxicology and biodistribution study in 30 NHPs with 4D-125. 4D-125 was administered at doses of 1E11 vg/eye or 1E12 vg/eye by intravitreal injection. Animals were sacrificed at three weeks, three months or six months. No meaningful toxicities were reported anywhere in the body, including specifically within the retina. Mild, transient uveitis was observed, but no chronic inflammation was reported; all animals were under systemic

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immunosuppression during the study. We detected vector genomes and XLRP transgene RNA expression in all treated retinas at both dose levels; the genome and RNA levels were higher in the high dose animals.

In an *in vitro* model of the disease, XLRP patient photoreceptors were derived from XLRP-diseased white blood cells that had been reprogrammed into induced pluripotent stem cells. Diseased photoreceptors were transduced with 4D-125 and protein lysates were harvested 30 days post-transduction. 4D-125 transduced cells expressed significantly more transgene product (hRPGRorf15) than control cells. Moreover, this expressed protein was shown to be active as measured by glutamylation (GT335).

Clinical Development: Phase 1/2 Clinical Trial

We are currently enrolling patients on a Phase 1/2 dose-escalation clinical trial, with four patients treated to date. This is a dose-escalation trial of intravitreal injection with 4D-125 in patients with clinically significant XLRP due to *RPGR* gene mutation. The primary objectives of this trial are to evaluate the safety and maximum tolerated dose of 4D-125. Secondary endpoints include assessments of biologic activity, including both visual field function and anatomical endpoints. Six patients total have been treated and followed for up to 18 weeks to date. Three patients in cohort 1 (3E11 vg/eye) have been treated. Following independent data safety monitoring committee approval of dose escalation, three patients have been treated in cohort 2 (1E12 vg/eye, the highest dose planned). 4D-125 has been well-tolerated and has not resulted in dose-limiting toxicities. No serious adverse events related to the agent have been reported.

4D-110 for Choroideremia

Disease Background, Unmet Medical Need and Target Patient Population

Choroideremia is a monogenic blinding disease, affecting approximately 13,000 patients in the United States and EU-5. No products are approved currently for the treatment of this disease in the United States or European Union. This X-linked, progressive degenerative disease of the retina and choroid is caused exclusively by mutations in the *CHM* gene that encodes for the REP1 protein. While choroideremia primarily affects men, some heterozygous females also suffer variable visual loss from the condition.

Choroideremia initially manifests as night-blindness and peripheral visual field defects, usually starting in the first two decades of life. As the disease progresses, the visual field begins to constrict relatively early in the disease's progression, which hinders patients' ability to conduct daily activities, such as driving. Many patients become blind by 30 years of age. A patient with advanced disease will be legally blind by virtue of poor visual acuity and minimal preserved visual field. Almost all mutations in the *CHM* gene result in production of a non-functional REP1 protein. REP1 is essential for the activation (prenylation) of Ras-associated binding (Rab) proteins involved in intracellular vesicle trafficking.

Our Solution

We are developing 4D-110 for the treatment of choroideremia. 4D-110 is designed for a single intravitreal injection and to benefit patients at all stages of disease, including early stage patients whose entire viable retinas are not adequately treated by subretinal injection. 4D-110 is comprised of R100 and is engineered to deliver the *CHM* transgene, the dysfunctional gene in choroideremia, to human RPE cells safely. We believe that 4D-110 has the potential, if approved, to successfully treat choroideremia patients at the earliest stages of their disease progression and ideally, slow or prevent progression and retain vision.

Competition and Differentiation: AAV Gene Therapy for Choroideremia

Conventional subretinal AAV gene therapy approaches are being developed to treat choroideremia. Subretinal administration results in transduction and direct treatment of only a small fraction of the retina. Biogen is developing a subretinally administered product candidate for choroideremia called NSR-REP1. In 2018, data was reported from a Phase 1/2 clinical trial in patients with end-stage choroideremia, who have only a small remaining area of viable retinal cells in the central field of vision and reduced visual acuity. In this trial, investigators concluded that best corrected visual acuity improved in a subset of patients. A pivotal randomized Phase 3 clinical trial was initiated in 2018. This AAV gene therapy approach requires invasive subretinal surgery, which has been associated with subretinal surgery-related adverse events. In addition, subretinal surgery results in transduction of only a small fraction of the retina and is therefore limited to patients with more advanced disease who have a small remaining area of viable retinal cells.

We believe 4D-110 has the potential to be differentiated from AAV gene therapies in development on the basis of four design features:

1. Safe and routine intravitreal route of administration: Unlike conventional AAV vectors such as AAV2, which are utilized in subretinal surgery product candidates for choroideremia, R100 was specifically selected for simple and safe intravitreal injection. Notwithstanding any potential design features of 4D-110, this ease of administration should result in safer and faster clinical trial enrollment, better efficacy and faster market uptake.
2. Treatment of the entire retinal surface: Unlike products candidates utilizing conventional AAV vectors and administered by subretinal surgery, which reportedly treat a small fraction of the retinal surface, 4D-110 can be used to treat the entire retinal surface following intravitreal injection.
3. Feasibility of treating early stage patients: We believe 4D-110 has the potential to safely treat early stage patients before they start to lose their retina. 4D-110 is designed to treat the entire surface of the retina, including the periphery where degenerative diseases like choroideremia start. In addition, intravitreal injection is recognized as a safe, simple and routinely used method of administering therapeutics.
4. Commercial opportunity: Intravitreal injections are widely adopted by many practicing ophthalmologists and used to treat a number of ophthalmological indications. As a result, we believe 4D-110 has the potential for rapid market uptake, if approved.

Preclinical Animal Model Pharmacology and Toxicology Studies

A total of 44 NHPs have been treated with 4D-110 on two GLP toxicology and biodistribution studies. No significant adverse effects or toxicities were reported.

We completed a single dose IND-enabling toxicology and biodistribution study in 27 NHPs dosed with 4D-110. 4D-110 was administered at doses of $1E11$ vg/eye or $1E12$ vg/eye by intravitreal injection. Animals were sacrificed at three weeks, three months or six months. No meaningful toxicities were reported anywhere in the body, including specifically within the retina. Mild, transient cortico-steroid responsive anterior uveitis was reported in a minority of treated NHP. No chronic inflammation was reported; all animals were under systemic immunosuppression during the study. We detected vector genomes and *CHM/REP1* transgene RNA expression in all treated retinas at both dose levels; the genome and RNA levels were higher in the high dose animals.

We subsequently completed a bilateral intravitreal 4D-110 GLP toxicology and biodistribution study in 17 NHPs dosed with 4D-110. 4D-110 was administered at doses of $3E11$ vg/eye or $1E12$ vg/eye by intravitreal injection. Animals were sacrificed at three weeks, 13 weeks and 26 weeks. No meaningful toxicities were reported anywhere in the body, including specifically within the retina.

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Transient cortico-steroid responsive uveitis was reported. No chronic inflammation was reported; all animals were under systemic immunosuppression during the study. We detected vector genomes and *CHM/REP1* transgene RNA expression in treated retinas at both dose levels.

In preclinical pharmacology studies involving human choroideremia patient-derived RPE cells, 4D-110 led to functional REP1 protein expression that corrected RAB27A trafficking from the cytoplasm to the cell membrane. In similar fashion to normal RPE cells, 4D-110-treated diseased RPE cells derived from choroideremia patients had RAB27A protein associated with their cell membranes; this finding confirmed the functionality of the REP1 protein expressed from 4D-110. In contrast, in untreated diseased cells, RAB27A was demonstrated diffusely throughout the cytoplasm.

Clinical Development: Phase 1 Clinical Trial and Natural History Study

We have fully enrolled a natural history study of over 50 patients with choroideremia to document rate of visual and anatomical decline, and to identify candidates who are most likely to benefit from participation in our current Phase 1/2 clinical trial. Fifty-five patients were enrolled and 47 of these patients have been followed for at least two years. Statistically significant declines in fundus autofluorescence area were reported by investigators over the two-year span after enrollment, with progression evident within 12 months. We expect that many of these subjects will enroll in our current Phase 1 clinical trial, or in future trials we may conduct.

We are currently enrolling patients on a Phase 1 clinical trial, with three patients treated to date. This is a dose-escalation trial of intravitreal injection with 4D-110 in patients with choroideremia due to *CHM* gene mutation. The primary objectives of this trial are to evaluate the safety and maximum-tolerated dose of 4D-110. Secondary endpoints include assessments of biologic activity, including visual acuity, visual field function and anatomical endpoints. Endpoint changes in each individual treated patient over time, before treatment while on the Natural History Study, will be compared to endpoint changes after 4D-110 treatment in the same patient whenever possible. Patients may therefore serve as their own control for assessments of these endpoints. In three patients treated on this Phase 1 trial to date and followed for up to 21 weeks, 4D-110 has been well-tolerated and has not resulted in dose-limiting toxicities. The independent data safety monitoring committee approved dose escalation to the highest planned dose level.

We licensed exclusive worldwide rights of 4D-110 to Roche in 2017. We are primarily responsible for initial development, including preclinical development, manufacturing, filing and maintaining the IND and conducting the Phase 1 clinical trial. Upon completion of initial development, Roche will be responsible for development including conducting any pivotal clinical trials and commercialization, if approved. We are entitled to development costs reimbursement, development milestones and royalties and sales milestones on this product candidate.

4D-150 for Wet AMD and Diabetic Retinopathy

Disease Background, Unmet Medical Need and Target Patient Population

Wet AMD is a type of macular degeneration where abnormal blood vessels (choroidal neovascularization or CNV) grow into the macula, the central area of the retina. As a consequence, CNV causes retina swelling and edema, and bleeding can occur and cause visual distortion and reduced acuity. The proliferation of abnormal blood vessels in the retina is stimulated by VEGF. This process distorts and can potentially destroy central vision and may progress to blindness without treatment. There are on average 200,000 new incidences of wet AMD per year in the United States alone. Wet AMD accounts for approximately 10% of all diagnosed cases of AMD, but it results in an estimated 90% of the legal blindness caused by all types of AMD. High expression levels of VEGF appear to play a causal role in the symptoms of wet AMD.

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Diabetes mellitus affects approximately 400 million adults worldwide and the prevalence is expected to increase by approximately 45% in the next decade. Diabetic eye disease, primarily diabetic retinopathy (DR), is a leading cause of vision loss and blindness in working-age adults and occurs due to the development of diabetic macular edema (DME; swelling, edema and hemorrhage in the central vision) and complications arising from proliferative diabetic retinopathy (PDR; retinal neovascularization causing bleeding and retinal detachment). The prevalence of diabetic retinopathy is high, affecting almost one-third of adults over 40 years of age with diabetes. In the United States approximately 4.2 million adults have DR and 655,000 have vision-threatening DR.

The current treatment paradigm for wet AMD and diabetic retinopathy, including DME, is intravitreal injection of patients with anti-VEGF proteins that inhibit the proliferation of new blood vessels, reducing edema and bleeding and allowing some visual acuity to be recovered. Most anti-VEGF therapies require repeated intravitreal injections in office every few weeks to every few months to obtain full efficacy. When patients miss doses, they may experience accelerated vision decline. Based on current clinical experience, after several years of treatment, the early vision gains are frequently lost, and acuity declines are observed for reasons that may include variable treatment regimens and poor patient compliance.

We believe these major retinal diseases are ideal candidate applications for gene therapy. There are multiple products on the market that validate the anti-VEGF therapeutic approach, and emerging randomized clinical trial data suggests that inhibiting additional molecular targets can extend the efficacy and durability of anti-VEGF alone. Delivering intravitreal therapies to the eye is routine, and there is an advantage for a single dose gene therapy that can provide long-term efficacy in patients for whom compliance, or treatment resistance, is a problem.

Our Solution

We are developing 4D-150, a wholly owned intravitreal AAV gene therapy candidate for wet AMD and diabetic retinopathy, including DME. These angiogenic diseases of the retina, including wet AMD and diabetic retinopathy, represent therapeutic markets of over \$9.7 billion in annual global sales. We retain all worldwide rights to 4D-150.

This product candidate is engineered for three distinct mechanisms-of-action. 4D-150 is engineered to inhibit VEGF and PlGF (placental growth factor) via aflibercept expression and secretion, and to inhibit a third angiogenic factor via an additional transgene insert. We believe that targeting three different angiogenic factors has the potential for greater efficacy versus a single anti-VEGF mechanism-of-action in patients with these retinal diseases, including patients with resistance to anti-VEGF therapy alone. Intravitreal delivery of biologics to the eye is routine, and there would be an advantage for a single dose therapy that could provide long-term efficacy in patients for whom compliance, or treatment resistance, is a problem.

Competition and Differentiation: AAV Gene Therapy for wet AMD and Diabetic Retinopathy

AAV gene therapy approaches are being developed by several companies to treat wet AMD by delivering a functional copy of an anti-angiogenic transgene by either subretinal injection with a conventional AAV vector, or intravitreal administration with a mouse-evolved vector. It remains to be demonstrated whether conventional AAVs or mouse-evolved vectors can deliver significant retinal coverage while limiting off-target effects. In comparison, our targeted and evolved vectors are designed and tested in NHPs which more closely resembles the anatomy of the human eye. We believe this provides comprehensive retinal coverage through less invasive and more commonly used intravitreal injections while delivering an improved tolerability profile with limited inflammation. To our knowledge, 4D-150 would be the only AAV gene therapy asset in wet AMD and DR to utilize an intravitreal vector (R100) discovered through directed evolution in NHP. In addition, *in vitro* studies of R100 versus AAV2 have shown superior transduction by

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R100 on human retinal cells. We have not compared R100 to AAV2 in patients in clinical studies. R100 has been associated with a low inflammation profile and lack of adverse findings in 91 NHP eyes injected on GLP toxicology studies.

In addition, to our knowledge, 4D-150 is the first gene therapy product candidate for the eye designed to implement three mechanisms of action by directly inhibiting three different angiogenic growth factor targets, including VEGF and PlGF. We therefore believe there is significant differentiation between our gene therapy product candidate and other AAV gene therapeutics in development in this therapeutic area.

We believe 4D-150 has the potential to be differentiated from approved agents, and those in clinical development to our knowledge, on the basis of five design features:

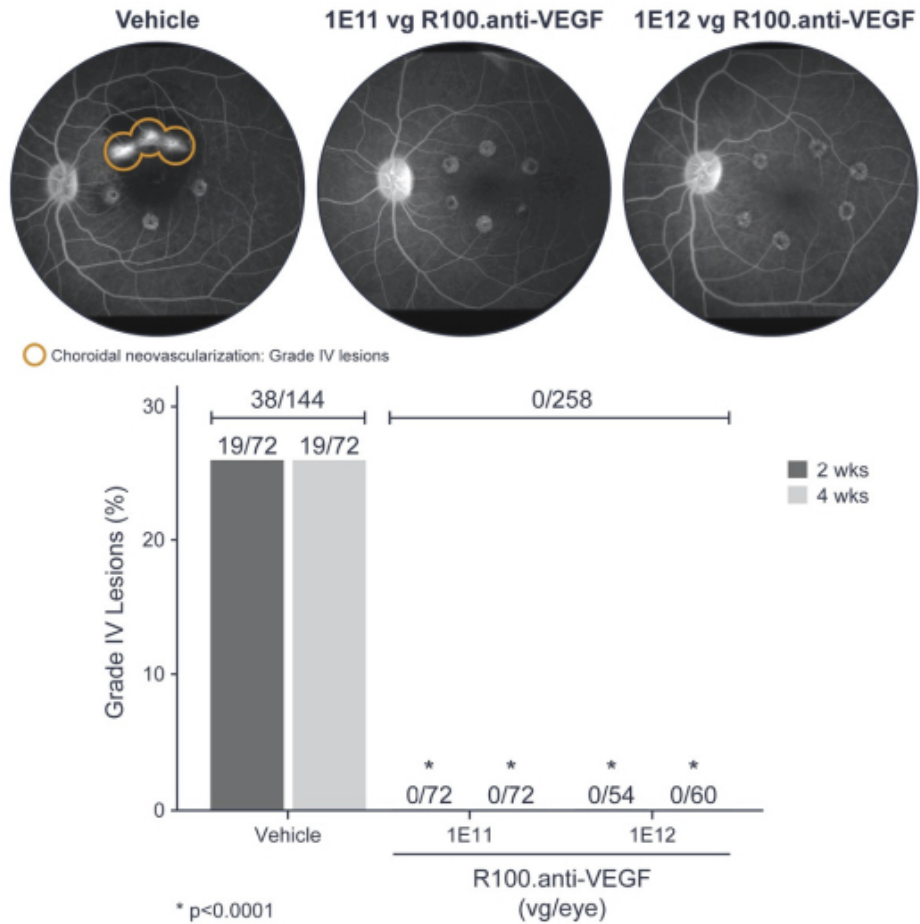
1. Three distinct mechanisms-of-action: An intravitreal dose of 4D-150 should result in sustained anti-angiogenic effects through three distinct mechanisms of action.
2. One-time therapy: Unlike intravitreal protein therapeutics that require repeat dosing every few weeks for a patient's lifetime, 4D-150 is designed as a one-time dose.
3. Novel vector evolved in NHPs for efficient intravitreal delivery: Unlike conventional AAV vectors such as AAV2 or the mouse-evolved AAV vector 7m8, R100 was specifically selected from our collection of over one billion synthetic capsid sequences in NHPs and for use in humans.
4. Low inflammation profile design: Following intravitreal injection, R100 has shown low inflammation profile and no significant adverse findings in three GLP toxicology studies, involving 91 NHP eyes, with two different 4DMT products utilizing the R100 vector (4D-110, 4D-125).
5. Commercial opportunity: Intravitreal injections are widely adopted by many practicing ophthalmologists and used to treat a number of ophthalmological indications. As a result, we believe 4D-150 has the potential for rapid market uptake, if approved. Additionally, the low inflammation profile we have observed in our R100-based GLP toxicology studies, if reproduced in the clinic with 4D-150, may promote broad product adoption if approved.

Preclinical Animal Model Pharmacology and Toxicology Studies

We carried out a proof-of-concept efficacy study in NHPs with a research construct using the R100 vector to deliver an anti-VEGF transgene (R100.anti-VEGF). In this study using the retinal laser-induced CNV model, we treated animals with intravitreal R100.anti-VEGF at doses of both 1E11 and 1E12 vg per eye. Animals received steroid treatment for 28 days following IVT administration of R100.anti-VEGF and remained off steroids for the remainder of the study. No adverse findings were reported in-life through 12 months of follow up. Control animals had the most severe (grade 4) angiogenic and leaky retina lesions in approximately 26% (19 of 72) of laser-targeted sites at two weeks and four weeks. Conversely, none of the sites in treated animals at either dose level at either timepoint had grade 4 lesions ($p < 0.0001$).

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Our 4D-150 prototype comprising R100 expressing an anti-VEGF protein prevented development of Grade IV lesions at 2 and 4 weeks after administration in 100% of lasered locations in the NHP retina at both low and high doses



† In the 1E12 vg treatment group, three NHP eyes (18 lesions) and two NHP eyes (12 lesions) were not assessable at the 2 week and 4 week timepoints, respectively.

A study of 4D-150 in the retinal laser-induced CNV model in NHPs is in the planning stages, as is a GLP toxicology and biodistribution study in NHP.

Development Plan

We have initiated an IND-enabling GLP toxicology and biodistribution study in NHPs and expect to initiate a clinical trial in the second half of 2021.

4D-135 for Autosomal Dominant Retinitis Pigmentosa (adRP)

Disease Background, Unmet Medical Need and Target Patient Population

adRP is a rare inherited autosomal dominant genetic disorder that occurs in both sexes and causes progressive vision loss and blindness. There are currently no approved therapies for adRP. adRP is characterized by dysfunction and degeneration of photoreceptors in the retina. Approximately 35% of adRP cases are caused by mutations in the *rhodopsin* (RHO) gene. The estimated worldwide prevalence of adRP due to RHO variants is approximately one in 52,000 people, which represents approximately 11,600 patients in the United States and EU-5. Loss of RHO function in retinal cells causes the progressive loss of rod photoreceptors, leading to the loss of vision experienced by patients. Symptoms of adRP are initially characterized by night blindness, followed by loss of peripheral visual field, decreasing visual acuity and eventually blindness.

Our Solution

We are developing 4D-135, a wholly owned intravitreal AAV gene therapy product candidate for the treatment of patients with adRP caused by mutations of the *RHO* gene. 4D-135 is designed to benefit patients at all stages of adRP, including early stage patients whose entire viable retina are not adequately treated by subretinal surgery. This product candidate is comprised of R100, an intravitreally administered targeted and evolved vector. 4D-135 is engineered to carry an RNAi targeting mutation-independent adRP and a *RHO* transgene resistant to the RNAi in a broad suppress and replace approach. We retain all worldwide rights to 4D-135.

Competition and Differentiation: AAV Gene Therapy for adRP

A few companies are developing therapies for patients with adRP, including a subretinal AAV gene therapy product candidate. We believe 4D-135 has the potential to be differentiated from other AAV gene therapies in development to our knowledge, on the basis of five design features:

1. Long term durable RNAi activity: In contrast to relatively short-acting ASO technology, 4D-135 is designed for DNA-based delivery of long-term RNAi activity against the mutant *RHO* gene product.
2. Safe and routine intravitreal route of administration: Unlike conventional AAV such as AAV2, which are utilized in subretinal surgery product candidates for other retinal diseases like XLRP, R100 was specifically selected for safe and routine intravitreal injection. This ease of administration should result in faster clinical trial enrollment.
3. Treatment of the entire retinal surface: Unlike product candidates utilizing conventional AAV vectors and administered by subretinal surgery, which reportedly treats a small fraction of the retinal surface, 4D-135 is designed to be used to treat the entire retinal surface following intravitreal injection.
4. Feasibility of treating early stage patients: Given the potential of 4D-135 to treat the entire surface of the retina, including the periphery where degenerative disease like adRP start, we believe it will be feasible to safely treat early stage patients before onset of retinal degeneration. In addition, intravitreal injection is recognized as a safe, simple and routinely used method of administering therapeutics.
5. Commercial opportunity: Intravitreal injections are widely adopted by many practicing ophthalmologists and used to treat a number of ophthalmological indications. As a result, we believe 4D-135 has the potential for rapid market uptake, if approved.

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Preclinical Animal Model Pharmacology and Toxicology Studies

We plan to complete a single dose IND-enabling toxicology and biodistribution study in NHP. We are also developing an *in vitro* model of diseased photoreceptors derived from adRP patients. These diseased photoreceptors will be treated with 4D-135.

Development Plan

We expect to initiate IND-enabling studies for 4D-135 in 2021.

Cardiology Therapeutic Area

Introduction

We are developing product candidates to treat cardiomyopathies. These target indications may include both primary cardiomyopathies that involve the heart exclusively, as with hypertrophic cardiomyopathies, or secondary cardiomyopathies that occur in the context of a systemic disease syndrome, as with lysosomal storage diseases. In the context of secondary cardiomyopathies, such as Fabry disease, we design and engineer the product to treat all diseased organs including the high unmet medical need in the heart. Our targeted and evolved vector C102, used in all of our cardiology product candidates, was invented for low dose intravenous infusion, leading to transgene expression throughout the myocardium in all regions of the heart. We believe that this modular product approach, utilizing C102 for all of our cardiology product candidates, and by switching the therapeutic transgene inserts, will help inform the clinical development of subsequent product candidates using the same vector.

Our lead product candidate, 4D-310, is currently in an ongoing Phase 1/2 clinical trial in adult patients with classic (severe) Fabry disease. The primary objectives of this trial are to evaluate the safety and maximum-tolerated dose of 4D-310. Secondary endpoints include biomarker assessments of plasma AGA activity and markers of biologic activity in the heart, including cardiac MRI. We expect to treat early onset classic Fabry disease patients initially and hope to expand into severely affected late-onset patients, including those with cardiomyopathy. Patients are currently being screened for enrollment in cohort 1 (1E13 vg/kg). We expect to report initial clinical data in 2021. 4D-310 received Fast Track Designation from the FDA in third quarter of 2020 for the treatment of Fabry disease to improve pain, disability and organ dysfunction.

4D-310 for Fabry Disease

Disease Background, Unmet Medical Need and Target Patient Population

Fabry disease is a monogenic disease caused by mutations in the *GLA* gene which encodes for the alpha-galactosidase A (AGA) enzyme that results in the body's inability to produce sufficient AGA enzyme activity, causing the accumulation of toxic levels of sphingolipids, such as the substrate globotriaosylceramide-3 (Gb3), in critical organs, including the heart, kidney and blood vessels. The cardiomyopathy in Fabry disease is the leading cause of death, accounting for 54% of deaths, and is secondary to the systemic lysosomal storage disease syndrome. Such substrate accumulation in the heart can lead to life-threatening heart failure, arrhythmias, vascular blockages. Fabry disease is progressive and fatal, with an average life expectancy of approximately 50 years. Progression of the disease causes significant reduction in the quality of life and significant economic burden associated with greater patient needs for supportive care.

Annual worldwide sales of Fabry medicines were approximately \$1.5 billion in 2019. We estimate the potential initial addressable male Fabry patient population in the United States and EU-5 to be up to 19,000 individuals, 57% of which suffer from Classic Fabry disease. Of note, we estimate the

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prevalence of individuals with Fabry disease-associated *GLA* mutations in the United States and EU-5 falls between 50,000 and 70,000 in the United States and the EU-5 based on recent newborn screening. Pre-treatment antibody titers to gene therapy, including 4D-310, may result in a reduction in the addressable patient population, if antibody titers at baseline are shown to be predictive of treatment response and/or tolerability.

The current treatment paradigm for Fabry disease is an infusion of replacement AGA enzyme every two weeks, a class of therapies broadly referred to as enzyme replacement therapies (ERT). For example, Fabrazyme received accelerated regulatory approval in the United States based on improvements in kidney interstitial capillary substrate biopsy endpoint, but it failed the primary endpoint in registrational trials and lacks full approval in the United States.

In addition to high burdens of therapy, due to the short-half life in the blood, patients on ERTs lack therapeutic concentrations of AGA in their blood for the majority of time between infusions, potentially limiting clinical benefit. Furthermore, since AGA is normally produced within target cells themselves, ERTs reportedly lack efficient uptake by parenchymal cells including cardiomyocytes; hence, patients remain at risk of cardiac complications including death. Finally, antibodies develop to AGA in the majority of classic Fabry disease patients after ERT and can further worsen clinical outcomes.

Therefore, we believe cardiac-targeted treatment of Fabry disease is still an unmet medical need.

Our Solution

We are developing 4D-310 for the comprehensive systemic treatment of Fabry disease. 4D-310 is designed for an efficient, single low dose IV administration to benefit classic and late onset patients, including those who have previously received ERT. 4D-310 is comprised of C102 and is engineered with a codon-optimized *GLA* transgene under control of a ubiquitous promoter. 4D-310 is designed to generate both high, stable plasma AGA activity, potentially resulting in cross correction of a broad range of critical organs, and to generate AGA activity via intracellular production within disease cells including cardiomyocytes.

We believe 4D-310 has the potential for “mutation independent” treatment of both “classic” (early onset, severe) as well as late onset Fabry disease, both of which are often associated with cardiomyopathy. We believe reducing substrate in cardiomyocytes would represent a strategic advantage and significant opportunity in the treatment of Fabry-associated cardiomyopathy, which we believe remains a significant unmet medical need and leading cause of death in Fabry disease patients.

In addition, AGA produced by 4D-310 within target cells themselves will not be exposed to serum antibodies against AGA. These antibodies develop following ERT in approximately 80% of classic Fabry disease patients. We therefore have the potential to treat this patient population via intracellular production of AGA, in contrast to approaches that rely exclusively on delivery of AGA through the bloodstream.

Finally, single dose gene therapy treatment with 4D-310 may obviate the need for biweekly ERT infusions in these patients, and/or for every other day small molecule medicines for patients amenable to AGA chaperone therapy.

Competition and Differentiation: AAV and Lentivirus-Engineered Stem Cell Gene Therapy for Fabry Disease

Several companies are developing liver-expressing AAV gene therapy for Fabry disease through the use of non-targeted AAV designed for expression from the liver only using liver-specific promoters

to restrict transgene expression to the liver. These product candidates are designed to produce and secrete AGA enzyme for activity in the blood, as with ERT, but with more stable blood levels than achieved with intermittent ERT infusions. When administered as ERT in patients, the AGA protein has not been shown definitively to enter cardiomyocytes or other affected parenchymal cells. It is therefore unclear whether gene therapy production of AGA from the liver or stem cells alone, with secretion into the bloodstream, would result in effective correction in cardiac muscle cells or other affected parenchymal cells such as in the kidney.

We believe 4D-310 is the only gene therapy candidate designed specifically to express the AGA enzyme in cardiac tissues, as well as in other affected tissues in these patients, potentially addressing a major unmet medical need.

We believe 4D-310 has the potential to be differentiated from approved agents, and those in clinical development to our knowledge, on the basis of four design features:

1. Dual mechanisms-of-action: An IV dose of 4D-310 is designed to generate both stable sustained levels of AGA enzyme activity in blood and endothelial cells following secretion from the liver, plus high AGA levels directly within muscle cells throughout the heart. Cells within the kidney, blood vessels and small intestine also produce intracellular AGA after 4D-310 treatment, albeit at significantly lower levels than in the heart.
2. One-time therapy: Unlike AGA chaperones that require dosing every other day for a patient's life, or IV ERT every two weeks for life, 4D-310 is designed as a single dose potentially curative therapy.
3. AGA mutation-independent biologic activity: Unlike AGA chaperones that are only effective against specific AGA mutations present in a minority of Fabry patients, 4D-310 is designed to treat in Fabry patients with any AGA mutation.
4. Resistance to AGA antibodies: We believe that 4D-310 may be able to treat patients that have anti-AGA antibodies. Those antibodies develop in approximately 80% of classic Fabry disease patients (early onset, severe disease) treated with ERT. This is in contrast to competing approaches that rely exclusively on AGA delivery through the bloodstream, that may be inhibited by these antibodies since AGA comes into contact with anti-AGA antibodies that may inhibit delivery to target organs. Unlike ERT and gene therapies that are designed to rely exclusively on AGA production and secretion from the liver into the blood, 4D-310 is designed to include intracellular AGA production in target tissues themselves, thus avoiding antibody contact and inhibition. We therefore plan to evaluate the treatment of patients with pre-existing AGA antibodies, potentially resulting in a larger addressable patient population.

The target product profile for 4D-310 is compared to competing technologies below. Many aspects of this profile have been supported by data generated to date with either the C102 vector or with 4D-310 itself.

MOA	Product Design	ERT		Gene Therapy	
		AGA enzyme infusions	Patient-derived Stem Cells	AAV-mediated Liver-directed	4D-310
AGA Delivery Through the Bloodstream	Pharmacokinetics				
	Cross-correction endothelial cells	+	+	+	+
	Single dose administration	-	+	+	+
	Stable sustained concentration of AGA enzyme activity in blood	-	+	+	+
	AGA production & secretion from the liver	-	-	+	+
No required chemotherapy—bone marrow ablation	n.a.	-	+	+	
AGA Production in Target Cells	Heart	-	-	-	+
	Kidney	-	-	-	+
	Blood vessels	-	-	-	+
Avoid AGA Neutralization	Intracellular production	-	-	-	+

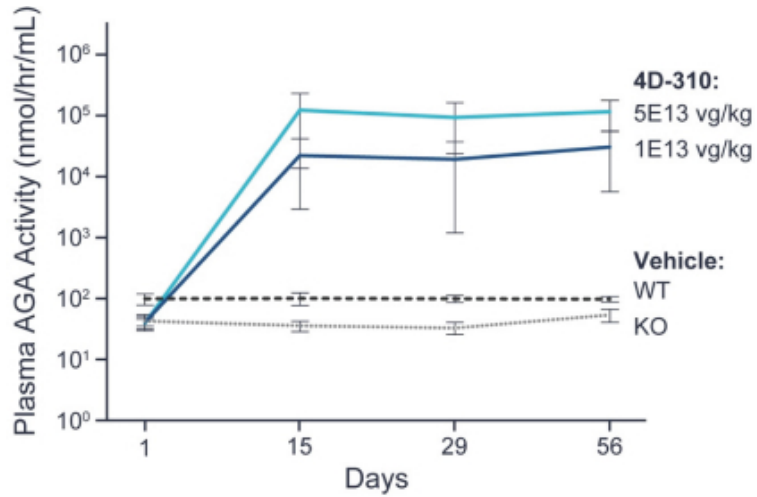
Abbreviations: Ab, antibodies; AGA, aspartylglucosaminidase; AAV, adeno-associated virus; ERT, enzyme replacement therapy; IV, intravenous; n.a., not applicable.

Preclinical Animal Model Pharmacology and Toxicology Studies

We completed an IND-enabling GLP toxicology and biodistribution study of 4D-310 in normal mice. No meaningful toxicity was reported at doses up to 1.5E14 vg/kg, based both on in-life and histopathology assessments. This dose is 300% of the highest planned dose in our Phase 1/2 clinical trial. 4D-310-mediated AGA expression and/or AGA enzyme activity was observed in all target tissues tested, including heart, kidney, blood vessels, small intestine and blood.

Pharmacology studies have been completed in Fabry disease knock-out mice. We observed that a single IV treatment with 4D-310 resulted in high stable blood concentrations and durable AGA production in target tissues, including the heart and kidney, and that toxic Gb3 metabolites were reduced significantly in all evaluated target tissues versus vehicle control. Efficacy was demonstrated with doses as low as 1E12 vg/kg. No adverse findings were observed in these knock-out animals at doses as high as 5E13 vg/kg.

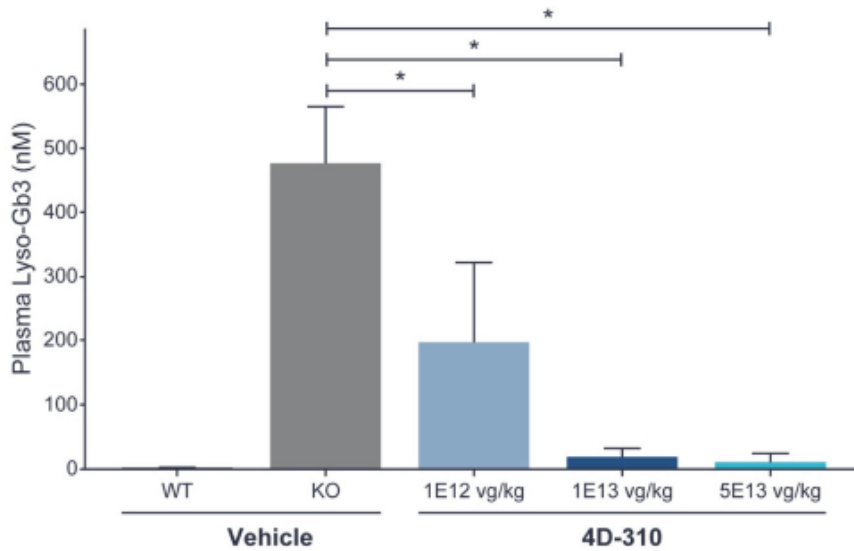
Plasma AGA activity in Fabry mice after treatment with 4D-310 was measured to be approximately 1,200-fold higher than in control vehicle-treated Fabry mice at all measured timepoints after treatment with 4D-310 at 5E13 vg/kg.



WT = wild type

KO = Fabry knock out mouse model

Dose-dependent decrease in plasma lyso-Gb3 was measured at Week 8 in Fabry mice after treatment with 4D-310. 1E13 and 5E13 dose levels achieved reduction of plasma lyso-Gb3 by greater than 95%.

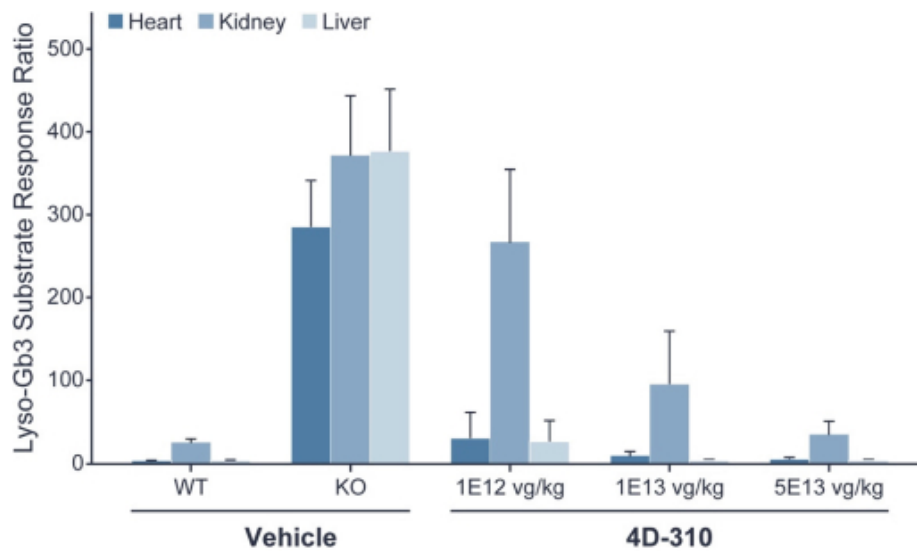


* p < 0.0001

WT = wild type

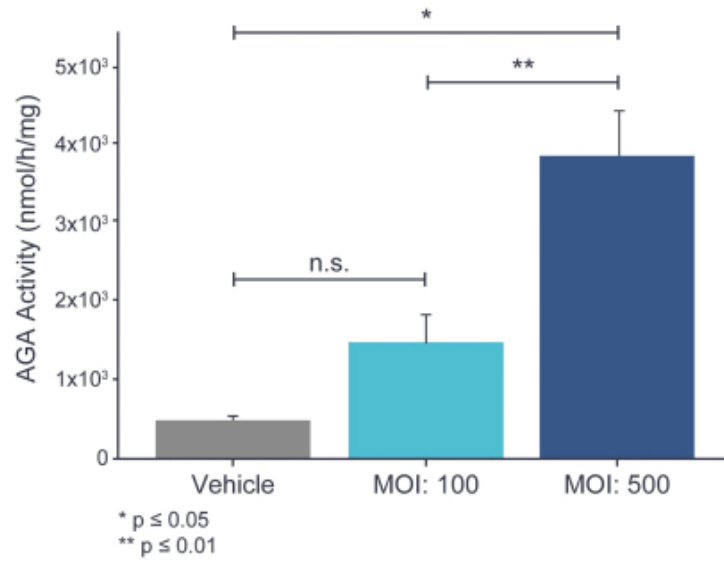
KO = Fabry knock out mouse model

Dose-dependent decrease in tissue Gb3 was measured at Week 8 in Fabry mice after treatment with 4D-310). Tissue Gb3 levels in Fabry mice approached that of normal mice in both heart and liver at 1E13 vg/kg and 5E13 vg/kg dose levels. Kidney Gb3 levels were reduced by approximately 75% in the 1E13 vg/kg group and levels approached normal in the 5E13 vg/kg dose group.



In studies with 4D-310 *in vitro* in human Fabry patient-derived cardiomyocytes, we observed dose-related AGA expression and function. Data in Fabry patient-derived cardiomyocytes demonstrated that treatment with 4D-310 results in efficient transduction and functional AGA protein production; AGA activity was observed both within Fabry cardiomyocytes and secreted into the media.

Cardiomyocytes that were differentiated from Fabry patient-derived fibroblasts expressed functional secreted AGA enzyme after treatment with 4D-310.



MOI = multiplicity of infection

n.s. = not significant

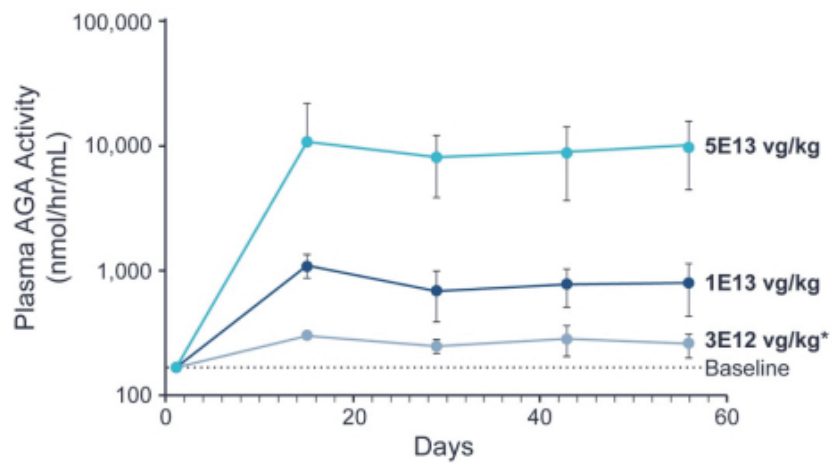
NT = not treated

We performed a dose-ranging toxicity and biodistribution study in NHPs. Doses of 3E12, 1E13 and 5E13 vg/kg were well-tolerated and resulted in AGA activity concentrations in blood equal to 1.5-fold, 3.4-fold and 70-fold higher than pretreatment blood levels, respectively, within 14 days after treatment. NHPs used in this study were healthy and had normal baseline levels of AGA activity. No meaningful toxicity was noted clinically or with blood testing. Histopathology assessments were normal. Tissue analyses demonstrated dose-related 4D-310 genome delivery, RNA expression and AGA activity throughout the heart, especially within the left ventricle which is the key target tissue; AGA expression and enzymatic activity were also demonstrated within the kidney.

Delivery (genomes) and transduction (mRNA) were consistently measured throughout organs important to the management of Fabry disease in all NHPs treated with 4D-310. The number of positive tissue samples within NHPs across all three dose levels are indicated below.

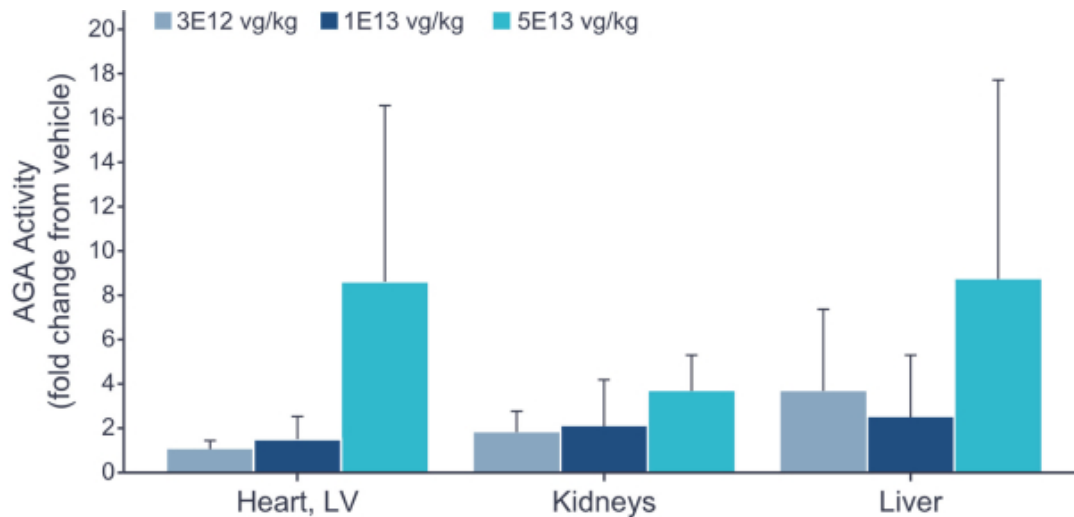
4D-310	Heart (LV)	Kidneys	Liver
Genome (qPCR)	18/18 (100%)	18/18 (100%)	18/18 (100%)
mRNA (RT-qPCR)	18/18 (100%)	18/18 (100%)	18/18 (100%)

Median plasma AGA activity in NHPs after treatment with 4D-310 was measured to be approximately 70-fold, 3.4-fold and 1.5-fold higher than baseline at 8 weeks after treatment with 4D-310 at 5E13, 1E13 and 3E12 vg/kg doses, respectively. Average plasma AGA activity levels for these time points are presented below.



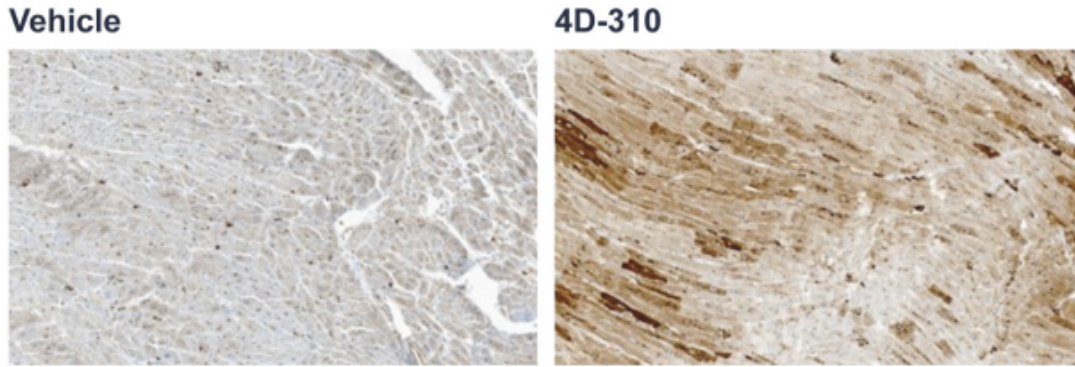
* One NHP in the low dose cohort has been excluded from the dataset as a positive statistical outlier as it exhibited AGA activity that was 66 to 124 standard deviations higher than the average of other NHPs treated with low dose 4D-310.

Tissue AGA activity was measured in key organs in healthy NHPs, with normal baseline AGA activity levels, after treatment with 4D-310 at low, medium and high doses. Below are data for tissues which are most important to the management of Fabry disease.



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IV delivery of 4D-310 in NHPs was associated with AGA enzyme detection (brown) by immunohistochemistry in the heart, kidneys and liver at low and high dose. Illustrative images below highlight transduction of cardiomyocytes at 5E13 vg/kg dose.



Clinical Development: Phase 1/2 Clinical Trial

Our Phase 1/2 clinical trial is open at two sites in the United States. GMP-grade clinical trial material has been produced and released by 4DMT for use in patients on this trial, and we have an open and active IND for 4D-310. We expect to enroll early onset classic Fabry disease patients initially, and eventually to also enroll severely affected late-onset patients, including those with cardiomyopathy. The primary objectives of this trial are to evaluate the safety and maximum-tolerated dose of 4D-310. Secondary objectives include biomarker assessments of plasma AGA activity and markers of biologic activity in the heart, including cardiac MRI. Patients are currently being screened for enrollment in cohort 1 (1E13 vg/kg). We expect to report initial clinical data from this trial in 2021.

Pulmonology Therapeutic Area

Introduction

We are developing product candidates to treat lung diseases. Our targeted and evolved vector, A101, is used in all of our pulmonology disease product candidates and was invented for aerosol delivery, leading to transgene expression throughout all regions of the lung airways and alveoli, as well as resistance to pre-existing antibodies in the human population. We believe that this modular product approach, utilizing A101 for multiple product candidates by switching the therapeutic transgene insert, will help inform the clinical development of subsequent product candidates using the same vector.

Our first pulmonology product candidate is 4D-710 for cystic fibrosis lung disease. This IND candidate has completed a non-GLP dose-ranging toxicology and biodistribution testing study in NHPs by aerosol delivery. No notable adverse effects were reported, and widespread biodistribution and transgene expression were observed throughout all lung segments tested in all NHPs. We have initiated an IND-enabling GLP toxicology and biodistribution study in NHPs. We expect to initiate a Phase 1/2 clinical trial for 4D-710 in the second half of 2021.

4D-710 for Cystic Fibrosis Lung Disease

Disease Background, Unmet Medical Need and Target Patient Population

Cystic fibrosis is the most common fatal inherited disease in the United States and results from mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. Cystic fibrosis

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causes impaired lung function, inflammation and bronchiectasis and is commonly associated with repeat and persistent lung infections due to the inability to clear thickened mucus from the lung, often resulting in frequent exacerbations and hospitalizations and eventual end-stage respiratory failure. There is no cure for cystic fibrosis, and the median age of death for patients is approximately 40 years in developed countries. Cystic fibrosis is considered a rare, or orphan, disease by both the FDA and the EMA. According to the Cystic Fibrosis Foundation, more than 30,000 people in the United States and more than 70,000 people worldwide are living with cystic fibrosis, and approximately 1,000 new cases of cystic fibrosis are diagnosed in the United States each year. Patients with cystic fibrosis require lifelong treatment with multiple daily medications, frequent hospitalizations and, ultimately, lung transplants in some end-stage patients. The quality of life for cystic fibrosis patients is compromised as a result of spending significant time on self-care every day and frequent outpatient doctor visits and hospitalizations.

Until recently, approved therapies to treat cystic fibrosis patients were only designed to treat the symptoms of cystic fibrosis, for example by preventing and controlling infections that occur in the lungs, rather than addressing the underlying cause of the disease. Accordingly, antibiotics are frequently used along with mucus-thinning drugs.

More recently, a new class of drugs called correctors and modulators target CFTR for patients with certain gene mutations. Several therapies from Vertex Pharmaceuticals Inc. have been approved for marketing in the United States and the European Union based on their ability to improve lung function in genetically defined subsets of cystic fibrosis patients. In 2019, the FDA approved triple drug therapy with Trikafta (elexacaftor/ivacaftor/tezacaftor), which Vertex believes would be applicable for up to 90% of cystic fibrosis patients, leaving at least 10% with no CFTR-targeted options. While these therapies improve lung function, they fall short of restoring it to the normal range in most patients, and these chronic therapies require daily dosing for the patient's lifetime. In addition, the existing cystic fibrosis drugs have been associated with tolerability issues, thus limiting their use.

We believe there is a clinical need and market opportunity for a durable aerosolized therapy, delivered by breath-actuated nebulizer, that can restore normal CFTR function across all cystic fibrosis patient subgroups, including patients who are receiving combination CFTR-modulator therapies and/or do not have appreciable CFTR protein expression and are therefore not amenable to CFTR modulators. We expect to explore single agent therapy with 4D-710 initially in patients who are not amenable to CFTR modulators (estimated to include approximately 10% of all cystic fibrosis patients), and to explore single agent or combination therapy with CFTR modulators for the remaining approximately 90% of cystic fibrosis patients.

Our Solution

We are developing 4D-710 for the treatment of a broad range of cystic fibrosis patients independent of their specific *CFTR* mutation. 4D-710 is designed for efficient single dose aerosol delivery to the proximal and medial airways and alveoli, subsequent mucus barrier penetration, lung epithelial cell transduction, and resistance to pre-existing antibodies in humans. The intended result is to achieve CFTR expression within lung airway epithelial cells for correction of cystic fibrosis lung disease. 4D-710 is comprised of our targeted and evolved vector, A101, and a codon-optimized version of a synthetic truncated *CFTR* transgene *deltaR-CFTR*, which we refer to as *microCFTR*. *microCFTR* is a construct that retains the most critical functional components of the full-size *CFTR* gene and is small enough to fit within AAV vector packaging constraints.

We believe 4D-710 has the potential to treat a broad range of cystic fibrosis patients independent of their specific *CFTR* mutation. Initially we plan to focus on the approximately 10% of all patients who are not amenable to existing medicines targeting the CFTR protein as we believe these patients have

the highest unmet medical need. In patients with CFTR mutations that are amenable to modulator medicines, while therapies demonstrate improvements in lung function, these modulators do not restore normal lung function in most patients. Further, these chronic therapies require daily dosing for the patient's lifetime. We therefore expect to eventually develop 4D-710 in this patient population, as a single agent and/or in combination with these CFTR modulator small molecule medicines.

We have funding and an on-going research and development collaboration with the Cystic Fibrosis Foundation for the development of 4D-710.

Competition and Differentiation: AAV Gene Therapy for Target Disease

A number of biotechnology companies have pursued gene therapy solutions to treat cystic fibrosis. We believe these prior attempts to deliver AAV gene therapy to the lungs of cystic fibrosis patients have failed due to an inability of conventional AAV vectors to penetrate through the lung mucus barrier and transduce lung cells efficiently. Further, we believe antibody neutralization of AAV likely also played a role in the lack of significant efficacy, as the mucosal immune system actively transports large quantities of antibodies into all mucus secretions, including the lung mucosa.

While a number of companies are currently pursuing other gene therapy solutions utilizing liposomes, lentivirus or conventional AAV vectors, these product candidates are in early stages of development. Moreover, they are not, to our knowledge, comprised of AAV vectors evolved in NHPs for aerosol delivery diffusely throughout the lung airways and alveoli. In addition, we believe these products were not designed for resistance to pre-existing antibodies to conventional AAVs, which is potentially a key requirement for successful delivery in the lung. As a result, to our knowledge, 4D-710 is the only AAV gene therapy product candidate in development designed specifically with a vector selected for aerosol delivery in NHPs, including humans, and with resistance to antibodies in the human population.

We believe 4D-710 has the potential to be differentiated from approved agents, and those in clinical development to our knowledge, on the basis of four design features:

1. **Corrective mechanism-of-action:** An aerosol dose of 4D-710 is designed to result in high levels of the CFTR protein directly within target cells lining the airway and alveoli. 4D-710 comprises a targeted and evolved vector invented for aerosol delivery, mucus barrier penetration and transduction of epithelial cells within the airways and alveoli of NHPs and humans.
2. **One-time therapy:** Unlike CFTR-targeted small molecules that require daily dosing for a patient's entire life, 4D-710 is designed for single or significantly less frequent dosing.
3. **CFTR mutation-independent efficacy:** Unlike CFTR-targeted small molecules that are only effective against specific mutations, 4D-710 is designed to be used in cystic fibrosis patients with any mutation, including in the approximately 10% of patients who are not amenable to standard medical therapy.
4. **Resistance to AAV antibodies:** Unlike conventional AAV vectors, which are sensitive to anti-AAV antibody inhibition, 4D-710 utilizes A101, a vector invented for resistance to human antibody inhibition.

Preclinical Proof-of-Concept Study with Evolved AAV for Aerosol Delivery in the Cystic Fibrosis Pig Model

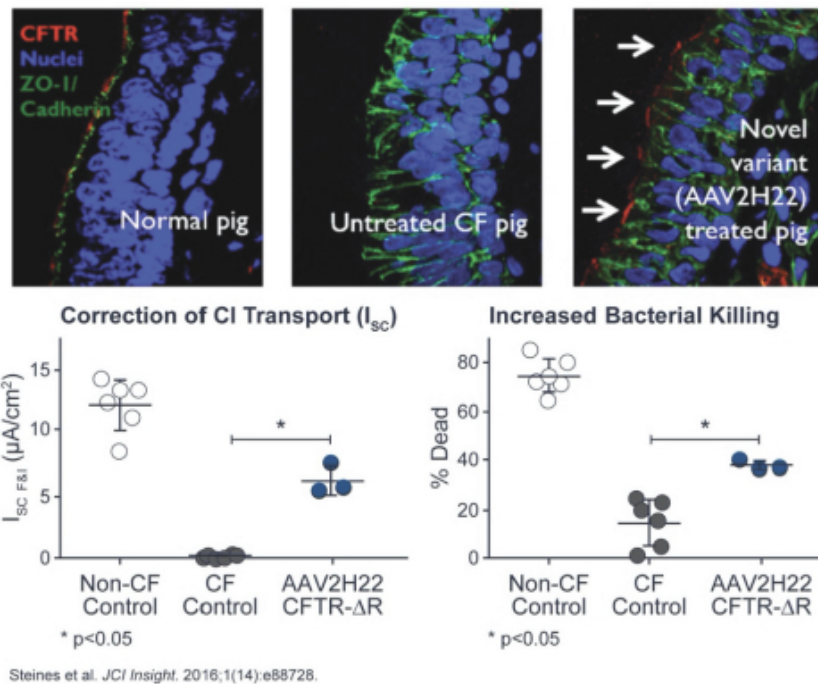
Our co-founder Dr. Schaffer and his academic colleagues conducted preclinical proof-of-concept studies for utilizing directed evolution to discover vectors for delivering a corrective *CFTR* gene

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construct to cystic fibrosis lung tissue in a large animal model of cystic fibrosis, and in a human cystic fibrosis patient lung tissue model. Building on these previous proof-of-concept studies, our product candidate 4D-710 will utilize a vector, A101, that was evolved and selected in NHPs, which we believe is more relevant for human use. The product was designed to package the same *microCFTR* transgene payload in this vector that was customized for use in humans.

Dr. Schaffer and his colleagues first demonstrated the potential to treat cystic fibrosis via aerosolized delivery of a targeted and evolved AAV vector (AAV2H22) in a pig model of cystic fibrosis. AAV2H22 was selected for highly efficient transduction of lung epithelial cells in pigs by conducting multiple rounds of directed evolution using aerosolized dosing in pigs. Aerosol delivery of *microCFTR* using the AAV2H22 vector resulted in CFTR expression in diseased pig lungs with expression patterns that resembled those observed in normal lungs from both pigs and humans. In addition to CFTR protein expression, AAV2H22-CFTR gene therapy also resulted in a significant increase in chloride ion transport compared to untreated controls as well as a reduction in bacterial colonies within the lungs of treated animals. Therefore, selection of an aerosol AAV vector *in vivo* in normal pigs led to the discovery of an AAV vector that was subsequently able to penetrate the thickened mucus barrier in the severe pig cystic fibrosis model.

Illustrative images in the top panels below exhibit the pattern of microCFTR expression observed by Steines et al. in normal pigs, untreated cystic fibrosis pigs and cystic fibrosis pigs treated with AAV2H22 carrying the microCFTR transgene payload (also referred to as CFTR-deltaR; same transgene utilized in 4D-710, but different AAV vector). The study involved six healthy pigs, six untreated cystic fibrosis pigs and three AAV2H22.microCFTR-treated cystic fibrosis pigs. These animals are represented by the dots in each of the graphs in the bottom panels which illustrate the range of responses between animals, and the significant difference between treated and untreated cystic fibrosis pigs.



CFTRΔR = MicroCFTR, Cystic Fibrosis transmembrane conductance regulator with removal of the R domain, a truncated version of the CFTR transgene engineered to fit within the payload size limitations of AAV

Cl⁻ = chloride ion

I_{sc} = short circuit current, a measurement of Cl⁻ movement through cell membranes

μA = microAmp

cm² = square centimeter.

In addition, Dr. Schaffer and colleagues used directed evolution in an *in vitro* human organotypic air-liquid interface model of lung epithelium to select AAV2.5T, which we in-licensed with exclusive worldwide rights. In preclinical studies, AAV2.5T carrying *microCFTR* transduced human lung epithelial tissue and resulted in expression of functional protein as suggested by increased chloride ion transport as compared to untreated control.

We believe that these results demonstrate that a targeted and evolved vector can penetrate the mucus layer of diseased cystic fibrosis lungs and deliver functional CFTR protein in a well-validated large animal model of the disease, as well as in human cystic fibrosis patient-derived organotypic lung models.

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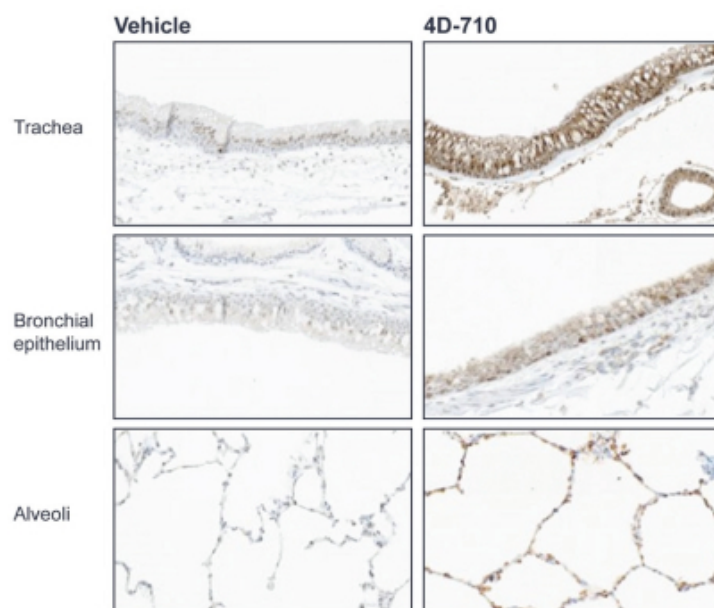
Preclinical Animal Model Pharmacology and Toxicology Studies

In our NHP study of a single aerosol delivered dose of 4D-710 at two different dose levels, treatment resulted in widespread distribution, CFTR transgene expression throughout both proximal and medial airways and alveoli. No meaningful inflammation or adverse findings were reported on in-life examinations, hematology or clinical chemistry analyses, or lung histology analyses. *Ex vivo* studies demonstrated highly significant resistance to neutralization by human pooled antibody preparations, with human IVIG pooled from over 1,000 individuals.

Delivery (genomes) and transduction (mRNA) were consistently measured throughout lung segments and samples in NHPs treated with 3E13 vg of aerosolized 4D-710. Number of positive tissue samples across three NHPs are indicated below.

4D-710	Lung
Genome (qPCR)	46/48 (95.8%)
mRNA (RT-qPCR)	44/48 (91.7%)

Aerosol delivery of 4D-710 in NHPs was associated with microCFTR protein detection by IHC (brown) in the proximal (trachea) and medial (bronchi) airway and in alveoli at low and high dose. Illustrative images below highlight transduction of the NHP lung at the 3E13 dose.



We plan to perform pharmacology studies in human cystic fibrosis lung tissues *ex vivo* in order to evaluate the function of the *microCFTR* transgene product; this protein has previously been shown to have relatively normal functional activity in a similar model *ex vivo*.

Development Plan

We have initiated an IND-enabling GLP toxicology and biodistribution study of 4D-710 in NHP. We expect to initiate a Phase 1/2 clinical trial for 4D-710 in the second half of 2021.

Competition

We are aware of several companies focused on developing gene therapies in various indications as well as companies addressing methods for modifying genes and regulating gene expression. We may also face competition from large and specialty pharmaceutical and biotechnology companies, academic research institutions, government agencies and public and private research institutions with genetic medicine and other therapeutic approaches.

With respect to 4D-125 for the treatment of XLRP, we consider our most direct AAV gene therapy competitors to be as follows: Biogen Inc. (candidate administered by subretinal surgery in a Phase 2 clinical trial), Applied Genetic Technologies Corporation (candidate administered by subretinal surgery in a Phase 1/2 clinical trial), Janssen Pharmaceuticals Inc. / MeiraGTx Holdings Plc (candidate administered by subretinal surgery in a Phase 1/2 clinical trial).

With respect to 4D-110 for the treatment of choroideremia, we consider our most direct competitors to be as follows: Biogen Inc. (candidate administered by subretinal surgery in a Phase 3 clinical trial) and Spark Therapeutics, Inc., a wholly owned subsidiary of Roche Holdings AG (candidate administered by subretinal surgery in a Phase 1/2 clinical trial).

We consider our most direct competitors with respect to 4D-150 for the treatment of diabetic retinopathy and wet AMD to be Eylea (aflibercept) from Regeneron Pharmaceuticals Inc., which is the current wet AMD standard of care, and a combination of antibody-based programs including Lucentis and faricimab from Roche, KSI-301 from Kodiak Sciences Inc., and OPT-302 from Opthea Limited, and gene-therapy based programs including ADVM-022 from Adverum Biotechnologies and RGX-314 from RegenxBio Inc., which are both AAV-based programs in Phase 1 studies. In addition, Roche is developing the Port Delivery System with Lucentis for use in patients with wet AMD.

We consider our most direct competitors with respect to 4D-310 for the treatment of Fabry disease to be Amicus Therapeutics, which has Galafold (migalastat) approved as a small molecule chaperone for specific mutations, and several gene therapy companies including AvroBio Inc., which is in Phase 3 development of an *ex-vivo* lenti-AGA based program, Freeline Therapeutics Holdings Plc, which is in Phase 1 development of AAVS2-based FLT-190, and Sangamo, which is in Phase 1 development of AAV2/6-based ST-920. Other competitors include Sanofi Genzyme, Takeda Pharmaceutical Company Limited and Protalix BioTherapeutics, all of which either commercialize or develop enzyme replacement therapy for the treatment of Fabry.

We consider our most direct competitors with respect to 4D-710 for the treatment of cystic fibrosis to be Vertex, which has several approved CFTR modulators, as well as other gene therapy companies in preclinical development of cystic fibrosis programs, including Krystal Biotech Inc., Abeona Therapeutics Inc., Spirovant Sciences Inc. and Editas Medicine Inc.

Manufacturing

CMC Strategy

In order to fulfill our strategy to maximize the robustness and internal control of our manufacturing processes from discovery and process development through to clinical-grade cGMP manufacturing, we have designed and are continually developing and scaling a robust in-house manufacturing platform for both GMP and non-GMP manufacturing. While many companies in the AAV gene therapy field in-license clinical trial material or manufacturing technologies from other companies or academic manufacturing centers, in contrast, our manufacturing processes were developed internally using internal technology transfers from our own process development labs. Our current in-house manufacturing capabilities include GMP manufacturing (upstream, downstream and fill/finish),

production capabilities for IND-enabling GLP toxicology studies and research candidate production. We intend to further scale these capabilities to support later stage clinical programs and indications requiring more patients and/or higher intravenous doses. In addition to our internal activities, we also collaborate with CMOs (Contract Manufacturing Organizations) such as Catalent.

Current Good Manufacturing Practices (cGMP) Capabilities

Our team has extensive experience with the manufacturing and analytical testing of numerous unique AAV capsids. Our team has internally manufactured approximately 90 unique AAV vectors, including both proprietary evolved 4DMT capsid variants and naturally occurring capsids. Our team has manufactured over 160 total lots of AAV vectors for research or clinical use. We have in-house cGMP manufacturing capabilities for clinical trial material production. Our manufacturing team has completed and released multiple lots of clinical trial material for our three product candidates in clinical development. This total also includes 13 lots of product candidate material for GLP toxicology and biodistribution studies. Leveraging internal testing capabilities in addition to qualified contract testing laboratories, we fully test and release our GLP and GMP lots for use in toxicology and clinical trials, respectively. We have developed and qualified assays for characterization, in-process testing and release and stability testing of our internally and externally manufactured proprietary AAV vectors.

Process Development Capabilities

We use robust, scalable and transferable manufacturing unit operations throughout both the vector characterization process and product development, which are both platform-specific and product-specific. The upstream manufacturing step involves triple plasmid transfections in an adherent HEK293 mammalian production cell line. Downstream manufacturing steps for purification and concentration include multiple orthogonal column chromatography steps and tangential flow filtration. The downstream purification columns used in our process are from stable sources including General Electric. Using internally developed manufacturing processes and testing, we characterize our novel capsids and payloads. In addition, leveraging internal expertise and capabilities, we package and test our novel vectors with payloads using internally developed manufacturing processes.

Manufacturing Facilities

Our manufacturing facilities are on site at company headquarters in Emeryville, California and include process development labs, an analytical development lab, and a cGMP manufacturing facility. These manufacturing facilities are also designed for production of material for GLP toxicology and biodistribution studies. Our manufacturing facility is approximately 3,200 square feet, of which approximately 1,500 square feet is dedicated to product manufacturing. For larger scale production for Phase 1 to Phase 3 clinical trials as well as potentially commercial launch materials, we intend to build a second cGMP facility. In this new facility, we expect to utilize large-scale bioreactors that are designed to enable higher titer clinical trial material lots as well as commercial launch materials. These manufacturing facilities are also designed for production of material for GLP toxicology and biodistribution studies.

Manufacturing Team

Our team of approximately 30 highly trained individuals is led by our Chief Technical Officer and Chief Operating Officer, Dr. Kamal, and includes eight Ph.D. scientists. Collectively, they have significant experience in viral vector manufacturing, chemistry-manufacturing-controls (CMC), regulatory affairs, analytical and process development, and quality assurance and controls. Our team also has experience prior to 4DMT with manufacturing multiple viral vectors from preclinical studies through to multiple Phase 3 trials. For example, Dr. Kamal helped to write and compile the AAV gene

therapy BLA for Zolgensma (Novartis), the first AAV gene therapy approved for intravenous administration in infants and babies.

Intellectual Property

Our commercial success depends in part on our ability to obtain and maintain proprietary protection for our product candidates, manufacturing and process discoveries, and other know-how, to operate without infringing the proprietary rights of others and to prevent others from infringing our proprietary rights. Our policy is to seek to protect our proprietary position by, among other methods, filing U.S. and foreign patent applications related to our proprietary technology, inventions and improvements that are important to the development and implementation of our business. We also rely on trade secrets, know-how, continuing technological innovation and potential in-licensing opportunities to develop and maintain our proprietary position.

Our product and lead optimization candidates were discovered by us utilizing our proprietary technology. We have filed several non-provisional and provisional patent applications, all owned by us, relating to our product and lead optimization candidates in the United States, certain foreign countries, and the World Intellectual Property Organization that are directed to compositions-of-matter, dosage unit forms, methods-of-treatment and medical use. We have also licensed several non-provisional patent applications, granted patents and international patent applications relating to our product and lead optimization candidates from U.C. Berkeley.

As of September 30, 2020, our solely owned patent portfolio includes three pending U.S. non-provisional applications, seventy-six pending foreign applications, two of which have been allowed, six granted foreign patents. We expect that United States and European patents and the patents, if issued, would expire between May 2037 and November 2038, excluding any additional term from patent term adjustment or patent term extension if appropriate maintenance and other governmental fees are paid. Additional patent term for the presently issued or later issued U.S. patents may be awarded as a result of the patent term extension provision of the Hatch-Waxman Amendments of 1984. In the European Union member countries, a supplementary protection certificate, if obtained, provides a maximum five years of market exclusivity. Our solely owned patent portfolio also includes five pending U.S. provisional patent applications.

In other jurisdictions (currently, Australia, Bahrain, Brazil, Canada, Chile, China, Colombia, Costa Rica, Egypt, India, Indonesia, Iran, Israel, Japan, Korea, Kuwait, Malaysia, Mexico, New Zealand, Oman, Peru, Philippines, Qatar, Russia, Saudi Arabia, Singapore, South Africa, Thailand, United Arab Emirates, Ukraine and Vietnam), granted patents, and any patents issued on pending applications, where applicable, relating to our product and lead optimization candidates, including composition of matter, dosage unit form, method-of-treatment and medical use, are expected to expire between May 2037 and November 2038, if the appropriate maintenance, renewal, annuity, and other government fees are paid. These patents and patent applications (if applicable), depending on the national laws, may benefit from extension of patent term in individual countries if regulatory approval of any of our product or lead optimization candidates is obtained in those countries. For example, in Japan, the term of a patent may be extended by a maximum of five years in certain circumstances.

As of September 30, 2020, our in-licensed patent portfolio includes four granted U.S. patents and seven granted foreign patents; each of these patents is expected to expire between June 2024. and June 2029. Our in-licensed patent portfolio also includes four pending U.S. non-provisional patent applications and fourteen pending foreign patent applications. We expect that United States and European patents, if issued from applications in our in-licensed portfolio would expire between June 2024 and June 2038.

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In other jurisdictions (currently, Australia, Brazil, Canada, China, France, Germany, Great Britain, Hong Kong, India, Italy, Japan, Korea and Mexico), granted patents issued on pending applications, where applicable, relating to our product and lead optimization candidates, including composition of matter and various other patents, including dosage unit form, method-of-treatment and medical use patents are expected to expire between June 2024 and June 2038, if the appropriate maintenance, renewal, annuity, and other government fees are paid. These patents and patent applications (if applicable), depending on the national laws, may benefit from extension of patent term in individual countries if regulatory approval of any of our product or lead optimization candidates is obtained in those countries. For example, in Japan, the term of a patent may be extended by a maximum of five years in certain circumstances.

Individual patents extend for varying periods depending on the date of filing of the patent application or the date of patent issuance and the legal term of patents in the countries in which they are obtained. Generally, patents issued for regularly filed applications in the United States are effective for 20 years from the earliest effective non-provisional filing date. In addition, in certain instances, a patent term can be extended to recapture a portion of the U.S. Patent and Trademark Office (USPTO) delay in issuing the patent as well as a portion of the term effectively lost as a result of the FDA regulatory review period. However, as to the FDA component, the restoration period cannot be longer than five years and the total patent term including the restoration period must not exceed 14 years following FDA approval. The duration of foreign patents varies in accordance with provisions of applicable local law, but typically is also 20 years from the earliest effective filing date. The actual protection afforded by a patent varies on a product by product basis, from country to country and depends upon many factors, including the type of patent, the scope of its coverage, the availability of regulatory-related extensions, the availability of legal remedies in a particular country and the validity and enforceability of the patent.

We also protect our proprietary technology and processes, in part, by confidentiality and invention assignment agreements with our employees, consultants, scientific advisors and other contractors. These agreements may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors. To the extent that our employees, consultants, scientific advisors or other contractors use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

Our commercial success will also depend in part on not infringing the proprietary rights of third parties. It is uncertain whether the issuance of any third-party patent would require us to alter our development or commercial strategies, alter our drugs or processes, obtain licenses or cease certain activities. Our breach of any license agreements or failure to obtain a license to proprietary rights that we may require to develop or commercialize our future drugs may have a material adverse impact on us.

Strategic Collaborations

Collaboration and License Agreement with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc.

In November 2017, we entered into a Collaboration and License Agreement (the Roche Agreement), with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc., collectively referred to as Roche. Under the Roche Agreement, we granted Roche an exclusive, sublicenseable, worldwide license under certain intellectual property rights to research, develop, make, use, import, export, and sell products and constructs using our proprietary AAV vectors to treat ophthalmological diseases and disorders, excluding treatment and prevention of cancer and central nervous system conditions (but not retinal nerves) and delivery of DNA-directed RNA interference (the Roche Field).

Under the terms of the Roche Agreement, we and Roche will engage in collaboration programs to develop one or more products, and choroideremia has been designated as the first collaboration program. We are primarily responsible for the initial development of such collaboration programs and Roche agreed to reimburse us for our development costs and expenses in accordance with the terms of the agreement. Upon completion of such initial development, we will transfer data, know-how and regulatory filings to the applicable collaboration program to Roche and Roche will be responsible for the development and commercialization of such program at its own cost and expense.

Subject to the terms of the Roche Agreement, either party may also develop one or more programs in the Roche Field independent of the other party at such party's own cost and expense. Roche has an option to elect one or more of the programs that we may independently develop under the agreement, including XLRP, which we have designated as our initial independent program. If Roche exercises its option, and subject to its payment of the applicable option exercise fee, we will transfer our data, know-how and regulatory filings related to such programs. If Roche does not exercise its option within the applicable option period, we will have the sole right to commercialization of such product. Each party agreed to various diligence obligations under the agreement.

Pursuant to the Roche Agreement, we received an upfront payment from Roche of \$21.0 million. In addition, we are entitled to contingent payments including (i) \$1.0 million for each Roche nominated product beyond the first three, (ii) up to \$30.0 million upon exercise of the option to convert a product we nominated and developed prior to pivotal clinical studies, (iii) up to \$223.0 million in specified development milestones in connection with the licensed products, \$86.0 million of which relate to choroideremia; and (iv) sales-based milestones of up to \$123.0 million based on worldwide calendar year net sales in connection with licensed products. On a product-by-product basis, Roche will also be required to pay us tiered royalties for worldwide calendar year net sales of products at percentages ranging from the mid-to high-single digit to mid-teens, in each case subject to reductions in accordance with the terms of the agreement. The royalties are payable on a product-by-product and country-by-country basis until the later of ten years after the date of first commercial sale of such product in such country and the expiration of the last-to-expire licensed patent right covering such product, which will expire on May 12, 2037.

The Roche Agreement will expire on the later of expiration of all payment obligations and the date when no products are actively developed by either party or both parties in accordance with the terms of the agreement. Either party may terminate the agreement in its entirety or on a country-by-country basis if the other party fails to cure its material breach within 90 days of receiving notice. Roche may terminate the agreement in its entirety, on a product-by-product basis or on a country-by-country basis upon 90 days' prior written notice. If we terminate the agreement for Roche's material breach or if Roche terminates the agreement without cause, the rights to the products generally revert back us. If we commercialize reverted products after such termination, we may be required to pay Roche tiered royalties for worldwide calendar year net sales of such products at percentages ranging from zero to the low-teens, in each case subject to reductions in accordance with the terms of the agreement. If Roche terminates the agreement for our material breach, Roche may retain its rights under the license that we grant to Roche under our intellectual property rights and Roche's payment obligations will survive.

Collaboration and License Agreements with uniQure biopharma B.V.

In August 2019, we entered into an Amended and Restated Collaboration and License Agreement (the Amended and Restated uniQure Agreement) with uniQure biopharma B.V., now uniQure N.V. (uniQure), which amended and restated the Collaboration and License Agreement that we entered into with uniQure in January 2014.

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Under the Amended and Restated uniQure Agreement, we granted uniQure an exclusive, sublicenseable, worldwide license under certain of our intellectual property rights, and other rights, to research, develop, make, use, and commercialize pre-selected AAV capsid variants (Selected Variants), and compounds and products containing such Selected Variants, using our proprietary AAV technology for delivery of gene therapy constructs to cells in the central nervous system and the liver (the uniQure Field). uniQure is solely responsible, at its cost and expense, to develop and commercialize the compounds and products containing the Selected Variants in accordance with the terms of the Amended and Restated uniQure Agreement. We retain all rights to all other AAV capsid variants, and compounds and products containing such AAV capsid variants, in the uniQure Field.

Also in August 2019, we entered into a separate Collaboration and License Agreement with uniQure (Second uniQure Agreement). Under the Second uniQure Agreement, the parties agreed to research and develop new AAV capsid variants that are not Selected Variants (New Variants) using our proprietary AAV technology for delivery of transgene constructs that affect certain targets (uniQure Targets) in the uniQure Field. We are responsible for the research of the New Variants, and uniQure is responsible for the development and commercialization of a certain number of compounds and products containing New Variants, that affect the uniQure Targets (Licensed Products). We granted uniQure an exclusive, sublicenseable, worldwide license under certain of our intellectual property rights, and other rights, to research, develop, make, use, and commercialize the Licensed Products. We retain all rights to New Variants in the uniQure Field that affect targets other than the uniQure Targets. We also retain all rights to any new AAV capsid variants developed under the agreements that are not New Variants, and compounds and products containing such variants.

Under both the Amended and Restated uniQure Agreement and the Second uniQure Agreement, uniQure will be required to pay us royalties on worldwide annual net sales of licensed products at a mid-single digit percentage rate, subject to certain specified reductions. These royalties are payable on a product-by-product and country-by-country basis until the latest of ten years after the date of the first commercial sale of such product in such country, the expiration of the last-to-expire licensed patent right covering such product in such country (of which there are none), and the expiration of any applicable exclusivity granted by a regulatory authority in such country for such product (the uniQure Royalty Term). uniQure will also be required to pay us a portion of the amounts it receives for licensing or sublicensing to third parties our intellectual property rights licensed or other rights otherwise granted under the Amended and Restated uniQure Agreement, and a portion of the amounts it receives for licensing to third parties our intellectual property rights granted under the or the Second uniQure Agreement, each at a rate between mid-single digit to mid-twenties percentages, depending on the stage of development at which such third-party grant occurs.

Under both the Amended and Restated uniQure Agreement and the Second uniQure Agreement, under certain circumstances, we may propose to uniQure, and uniQure may grant to us, a non-exclusive right for us to develop and commercialize certain licensed products based on Selected Variants in the uniQure Field, or the New Variants in the uniQure Field to deliver transgene constructs that affect the uniQure Targets (4DMT Proposed Products). Pursuant to the Second uniQure Agreement, under certain circumstances, uniQure may propose to us, and we may grant to uniQure a non-exclusive right for uniQure to develop and commercialize certain licensed products using any new AAV capsid variants developed under the agreement that are not New Variants in the uniQure Field to deliver transgene constructs that affect targets other than the uniQure Targets (uniQure Proposed Products). If either party obtains the rights to develop and commercialize a 4DMT Proposed Product or a uniQure Proposed Product, as applicable, such party will be required to pay the other party royalties on worldwide annual net sales of such products at a mid-single digit percentage rate, subject to specified reductions. These royalties will be payable on a product-by-product basis during the uniQure Royalty Term for such products. The party receiving such license will also be required to pay the other party a portion of the amounts that it may receive for licensing or sublicensing to third parties rights for

such 4DMT Proposed Products or uniQure Proposed Products, as applicable, at a rate between mid-single digit to mid-twenties percentages depending on the stage of development at which the sublicense is granted.

Each of the Amended and Restated uniQure Agreement and the Second uniQure Agreement will expire on the expiration of all payment obligations of the parties under such agreement. Each party may terminate either agreement for the other party's insolvency or bankruptcy. Each party may also terminate either agreement in its entirety in some circumstances or on an indication-by-indication basis if the other party fails to cure its material breach under the applicable agreement within 90 days of receiving notice, subject to an additional cure period in accordance with the terms of such agreement. uniQure may terminate either agreement upon 90 days' prior written notice. In addition, uniQure may terminate the Second uniQure Agreement at any point prior to the first anniversary of the effective date if the joint research committee determines that it would be futile to continue the research program under the agreement, including if such committee determines that certain agreed-upon development success criteria will not be able to be met, or if we are not making bona fide efforts to achieve the mutually agreed timelines set forth in the research plan. If we terminate either agreement for uniQure's material breach, insolvency or bankruptcy or if uniQure terminates either agreement for convenience or due to its determination of futility, the rights to the Selected Variants, and compounds and products containing such Selected Variants, or the uniQure New Variants, and compounds and products containing such uniQure New Variants, as applicable, generally revert back to us. If uniQure terminates either agreement for our material breach under the applicable agreement, insolvency or bankruptcy, uniQure may retain its rights to the intellectual property license grant under such agreement and uniQure's payment obligations will survive.

Exclusive License and Bailment Agreements with The Regents of the University of California

In December 2013, we entered into two Exclusive License and Bailment Agreements (the UC Agreements) with The Regents of the University of California (the UC Regents) with one of the agreements covering AAV2 capsid mutants with novel properties for enhanced performance in gene therapy and the other covering AAV for enhanced gene delivery in the presence of neutralizing antibodies. Under both UC Agreements, the UC Regents granted us an exclusive, sublicenseable license under certain patent rights to make, use, sell, offer to sell, and import products and services, and to practice methods in the United States and foreign countries where the licensed patent rights exist. The license grant under one UC Agreement is in all fields of use and the license grant under the other UC Agreement is in all fields of use, with the exception of the ophthalmic field. We agreed to certain general and specific diligence obligations under both UC Agreements in connection with the development, manufacture and sales of the licensed products, services and methods, in accordance with the terms of the UC Agreements.

Under each UC Agreement, we paid the UC Regents an upfront payment of \$5,000. Further, at the closing of our Series A financing that was a qualified financing pursuant to the UC Agreements, we issued 311,812 shares of our common stock in aggregate under both agreements. Under each UC Agreement, we agreed to pay the UC Regents a specified annual license maintenance fee in each year in which we do not owe royalties to the UC Regents. We also agreed to pay the UC Regents a mid-teens to mid-twenties percentage range of any consideration, including royalties (Sublicense Consideration), we receive for the grant of a sublicense under the licensed patent rights under each UC Agreement, with the consideration payable to the UC Regents to not exceed such percentage range in the aggregate under both UC Agreements for the same sublicense grant. We may reduce any Sublicense Consideration if we sublicense any of our own or third-party patent rights under the sublicense grant based on the relative value of the sublicensed patents. Upon the achievement of specified development and regulatory milestones by the first licensed product or method, we will be required to pay the UC Regents up to \$3.1 million under each UC Agreement. We will also be required to pay the UC Regents a royalty on net sales of licensed products, services and methods covered by

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the patents licensed under the UC Agreements at a percentage in the low single-digit percentage rate, subject to certain specified reductions. Under the UC Agreements, a specified minimum annual royalty will also be due to the UC Regents beginning the first calendar year after the year in which any net sales of a licensed product first occur, such minimum royalty amount to increase on an annual basis, but not to exceed \$0.1 million in the aggregate under both UC Agreements. Under each UC Agreement, royalties are payable until the expiration of the last-to-expire licensed patent right covering the licensed product, service or method, which will expire on June 28, 2038 (the UC Royalty Term). Milestone, royalty and sublicense revenue payments will be due to the UC Regents under only one of the UC Agreements covering any licensed product, regardless of the number of patents covering a given licensed product.

Each UC Agreement will expire at the end of the UC Royalty Term. The UC Regents may terminate each of the UC Agreements if we fail to cure a breach of such UC Agreement within 60 days of notice. If we fail to meet our diligence obligations, the UC Regents has the right to either terminate the UC Agreement or to reduce our exclusive license to a non-exclusive license, after giving us 60 days to cure or request arbitration. We may terminate either UC Agreement at-will in its entirety or with respect to any portion of the licensed patent rights upon 90 days prior written notice. Each UC Agreement will terminate immediately if we or a third party on our behalf files a claim asserting that the licensed patent rights are invalid or unenforceable.

Cystic Fibrosis Foundation

In 2016, we received a grant from Cystic Fibrosis Foundation (CFF) in the amount of \$525,000 to support discovery and development of product candidates to treat cystic fibrosis. The grant was increased to \$3.5 million in 2017 and was subsequently amended to allocate the \$3.5 million to different milestones. The grant provides for repayment to CFF upon the commercialization of any product developed under the grant. The repayment is capped at nine times multiple of the grant actually paid to us.

In April 2020, CFF made a \$10.0 million investment in our Series C redeemable convertible preferred stock financing. In return for the investment, CFF received shares of our Series C redeemable convertible preferred stock, and we and CFF entered into a Funding Agreement (the Funding Agreement). Pursuant to the terms of the Funding Agreement, we agreed to use the proceeds of the CFF investment to support development of 4D-710, our product candidate for the treatment of cystic fibrosis, and to match CFF's support for the product candidate. Upon acceptance by the FDA of an IND for 4D-710 (Acceptance), CFF will make an additional \$4.0 million investment (the Subsequent Investment). If our common stock is publicly traded at the time of Acceptance, CFF will receive shares of common stock priced at the 10-day average reported closing price of our common stock for the date of Acceptance. If our common stock is not publicly traded at the time of Acceptance, CFF will receive a convertible note, which shall be convertible into a number of shares issued in our next private preferred stock financing or common stock if an IPO occurs after Acceptance and prior to the next private preferred stock financing. We have agreed to use the additional \$4.0 million from the Subsequent Investment to support development of 4D-710 and to match CFF's support of the product candidate. Under the terms of the Funding Agreement, neither the \$10.0 million investment in the Series C redeemable convertible preferred stock nor the \$4.0 million of funding upon Acceptance are restricted as to withdrawal or usage.

Government Regulation

The FDA and other regulatory authorities at federal, state, and local levels, as well as in foreign countries, extensively regulate, among other things, the research, development, testing, manufacture, quality control, import, export, safety, effectiveness, labeling, packaging, storage, distribution, record

keeping, approval, advertising, promotion, marketing, post-approval monitoring, and post-approval reporting of biological product candidates such as those we are developing. We, along with third-party contractors, will be required to navigate the various preclinical, clinical and commercial approval requirements of the governing regulatory agencies of the countries in which we wish to conduct studies or seek approval or licensure of our product candidates. The process of obtaining regulatory approvals and the subsequent compliance with applicable federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. Biologics Regulation

In the United States, biological products are subject to regulation under the Federal Food, Drug, and Cosmetic Act, the Public Health Service Act, and other federal, state, local and foreign statutes and regulations. The process required by the FDA before biologic product candidates may be marketed in the United States generally involves the following:

- completion of preclinical laboratory tests and animal studies performed in accordance with the FDA's GLPs;
- submission to the FDA of an IND which must become effective before clinical trials may begin;
- approval by an IRB or ethics committee at each clinical site before the trial is commenced;
- performance of adequate and well-controlled human clinical trials to establish the safety, purity and potency of the proposed biologic product candidate for its intended purpose;
- preparation of and submission to the FDA of a BLA after completion of all pivotal clinical trials;
- satisfactory completion of an FDA Advisory Committee review, if applicable;
- a determination by the FDA within 60 days of its receipt of a BLA to file the application for review;
- satisfactory completion of an FDA pre-approval inspection of the manufacturing facility or facilities at which the proposed product is produced to assess compliance with cGMP and to assure that the facilities, methods and controls are adequate to preserve the biological product's continued safety, purity and potency, and of selected clinical investigation sites to assess compliance with Good Clinical Practices (GCPs); and
- FDA review and approval of the BLA to permit commercial marketing of the product for particular indications for use in the United States.

Prior to beginning the first clinical trial with a product candidate in the United States, we must submit an IND to the FDA. An IND is a request for authorization from the FDA to administer an investigational new drug product to humans. The central focus of an IND submission is on the general investigational plan and the protocol(s) for clinical trials. The IND also includes results of animal and *in vitro* studies assessing the toxicology, pharmacokinetics, pharmacology, and pharmacodynamic characteristics of the product; chemistry, manufacturing, and controls information; and any available human data or literature to support the use of the investigational product. An IND must become effective before human clinical trials may begin. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA, within the 30-day time period, raises safety concerns or questions about the proposed clinical trial. In such a case, the IND may be placed on clinical hold and the IND sponsor and the FDA must resolve any outstanding concerns or questions before the clinical trial can begin. Submission of an IND therefore may or may not result in FDA authorization to begin a clinical trial.

In addition to the submission of an IND to the FDA, under the National Institutes of Health, or NIH, Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines), supervision of

certain human gene transfer trials may also require evaluation and assessment by an institutional biosafety committee (IBC), a local institutional committee that reviews and oversees research utilizing recombinant or synthetic nucleic acid molecules at that institution. The IBC assesses the safety of the research and identifies any potential risk to the public health or the environment, and such assessment may result in some delay before initiation of a clinical trial. While the NIH Guidelines are not mandatory unless the research in question is being conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH Guidelines voluntarily follow them.

Clinical trials involve the administration of the investigational product to human subjects under the supervision of qualified investigators in accordance with GCPs, which include the requirement that all research subjects provide their informed consent for their participation in any clinical study. Clinical trials are conducted under protocols detailing, among other things, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. A separate submission to the existing IND must be made for each successive clinical trial conducted during product development and for any subsequent protocol amendments. Furthermore, an independent IRB for each site proposing to conduct the clinical trial must review and approve the plan for any clinical trial and its informed consent form before the clinical trial begins at that site and must monitor the study until completed. Regulatory authorities, the IRB or the sponsor may suspend a clinical trial at any time on various grounds, including a finding that the subjects are being exposed to an unacceptable health risk or that the trial is unlikely to meet its stated objectives. Some studies also include oversight by an independent group of qualified experts organized by the clinical study sponsor, known as a data safety monitoring board, which provides authorization for whether or not a study may move forward at designated check points based on access to certain data from the study and may halt the clinical trial if it determines that there is an unacceptable safety risk for subjects or other grounds, such as no demonstration of efficacy. There are also requirements governing the reporting of ongoing clinical studies and clinical study results to public registries.

For purposes of BLA approval, human clinical trials are typically conducted in three sequential phases that may overlap or be combined:

- Phase 1—The investigational product is initially introduced into healthy human subjects or patients with the target disease or condition. These studies are designed to test the safety, dosage tolerance, absorption, metabolism and distribution of the investigational product in humans, the side effects associated with increasing doses, and, if possible, to gain early evidence on effectiveness.
- Phase 2—The investigational product is administered to a limited patient population with a specified disease or condition to evaluate the preliminary efficacy, optimal dosages and dosing schedule and to identify possible adverse side effects and safety risks. Multiple Phase 2 clinical trials may be conducted to obtain information prior to beginning larger and more expensive Phase 3 clinical trials.
- Phase 3—The investigational product is administered to an expanded patient population to further evaluate dosage, to provide statistically significant evidence of clinical efficacy and to further test for safety, generally at multiple geographically dispersed clinical trial sites. These clinical trials are intended to establish the overall risk/benefit ratio of the investigational product and to provide an adequate basis for product approval.

In some cases, the FDA may require, or companies may voluntarily pursue, additional clinical trials after a product is approved to gain more information about the product. These so-called Phase 4 studies may also be made a condition to approval of the BLA.

Concurrent with clinical trials, companies may complete additional animal studies and develop additional information about the biological characteristics of the product candidate, and must finalize a process for manufacturing the product in commercial quantities in accordance with cGMP. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, must develop methods for testing the identity, strength, quality and purity of the final product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the product candidate does not undergo unacceptable deterioration over its shelf life.

BLA Submission and Review by the FDA

Assuming successful completion of all required testing in accordance with all applicable regulatory requirements, the results of product development, nonclinical studies and clinical trials are submitted to the FDA as part of a BLA requesting approval to market the product for one or more indications. The BLA must include all relevant data available from preclinical and clinical studies, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls, and proposed labeling, among other things. Data can come from company-sponsored clinical studies intended to test the safety and effectiveness of a use of the product, or from a number of alternative sources, including studies initiated by investigators. The submission of a BLA requires payment of a substantial user fee to FDA, and the sponsor of an approved BLA is also subject to an annual program fee. A waiver of user fees may be obtained under certain limited circumstances. Additionally, no user fees are assessed on BLAs for products designated as orphan drugs, unless the product also includes a non-orphan indication.

Within 60 days following submission of the application, the FDA reviews a BLA submitted to determine if it is substantially complete before the FDA accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. Once a BLA has been accepted for filing, the FDA's goal is to review standard applications within ten months after the filing date, or, if the application qualifies for priority review, six months after the filing date. Priority review designation will direct overall attention and resources to the evaluation of applications for products that, if approved, would be significant improvements in the safety or effectiveness of the treatment, diagnosis, or prevention of serious conditions. In both standard and priority reviews, the review process is often significantly extended by FDA requests for additional information or clarification. The FDA reviews a BLA to determine, among other things, whether a product is safe, pure and potent and the facility in which it is manufactured, processed, packed, or held meets standards designed to assure the product's continued safety, purity and potency. The FDA may also convene an advisory committee to provide clinical insight on application review questions. The FDA is not bound by recommendations of an advisory committee, but it considers such recommendations when making decisions regarding approval.

Before approving a BLA, the FDA will typically inspect the facility or facilities where the product is manufactured. The FDA will not approve an application unless it determines that the manufacturing processes and facilities are in compliance with cGMP and adequate to assure consistent production of the product within required specifications. Additionally, before approving a BLA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP. If the FDA determines that the application, manufacturing process or manufacturing facilities are not acceptable, it will outline the deficiencies in the submission and often will request additional testing or information. Notwithstanding the submission of any requested additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

After the FDA evaluates a BLA and conducts inspections of manufacturing facilities where the investigational product and/or its drug substance will be produced, the FDA may issue an approval

letter or a Complete Response Letter (CRL). An approval letter authorizes commercial marketing of the product with specific prescribing information for specific indications. A CRL will describe all of the deficiencies that the FDA has identified in the BLA, except that where the FDA determines that the data supporting the application are inadequate to support approval, the FDA may issue the CRL without first conducting required inspections, testing submitted product lots, and/or reviewing proposed labeling. In issuing the CRL, the FDA may recommend actions that the applicant might take to place the BLA in condition for approval, including requests for additional information or clarification. The FDA may delay or refuse approval of a BLA if applicable regulatory criteria are not satisfied, require additional testing or information and/or require post-marketing testing and surveillance to monitor safety or efficacy of a product.

If regulatory approval of a product is granted, such approval will be granted for particular indications and may entail limitations on the indicated uses for which such product may be marketed. For example, the FDA may approve the BLA with a Risk Evaluation and Mitigation Strategy (REMS), to ensure the benefits of the product outweigh its risks. A REMS is a safety strategy to manage a known or potential serious risk associated with a medicine and to enable patients to have continued access to such medicines by managing their safe use, and could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries, and other risk minimization tools. The FDA also may condition approval on, among other things, changes to proposed labeling or the development of adequate controls and specifications. Once approved, the FDA may withdraw the product approval if compliance with pre- and post-marketing requirements is not maintained or if problems occur after the product reaches the marketplace. The FDA may also require one or more Phase IV post-market studies and surveillance to further assess and monitor the product's safety and effectiveness after commercialization, and may limit further marketing of the product based on the results of these post-marketing studies.

Expedited Development and Review Programs

A sponsor may seek approval of its product candidate under programs designed to accelerate FDA's review and approval of new drugs and biological products that meet certain criteria. Specifically, new biological products are eligible for fast track designation if they are intended to treat a serious or life-threatening disease or condition and demonstrate the potential to address unmet medical needs for the disease or condition. Fast track designation applies to the combination of the product and the specific indication for which it is being studied. The sponsor of a fast track product has opportunities for more frequent interactions with the applicable FDA review team during product development and, once a BLA is submitted, the product candidate may be eligible for priority review. For a fast track product, the FDA may consider sections of the BLA for review on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the application, the FDA agrees to accept sections of the application and determines that the schedule is acceptable and the sponsor pays any required user fees upon submission of the first section of the application. A fast track designated product candidate may also qualify for priority review, under which the FDA sets the target date for FDA action on the BLA at six months after the FDA accepts the application for filing.

A product candidate intended to treat a serious or life-threatening disease or condition may also be eligible for breakthrough therapy designation to expedite its development and review. A product candidate can receive breakthrough therapy designation if preliminary clinical evidence indicates that the product candidate, alone or in combination with one or more other drugs or biologics, may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. The designation includes all of the fast track program features, as well as more intensive FDA interaction and guidance beginning as early as Phase 1 and an organizational commitment to expedite the development and review of the product candidate, including involvement of senior managers.

In 2017, the FDA established a new regenerative medicine advanced therapy (RMAT) designation as part of its implementation of the 21st Century Cures Act. The RMAT designation program is intended to fulfill the 21st Century Cures Act requirement that the FDA facilitate an efficient development program for, and expedite review of, any drug or biologic that meets the following criteria: (i) the drug or biologic qualifies as a RMAT, which is defined as a cell therapy, therapeutic tissue engineering product, human cell and tissue product, or any combination product using such therapies or products, with limited exceptions; (ii) the drug or biologic is intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition; and (iii) preliminary clinical evidence indicates that the drug or biologic has the potential to address unmet medical needs for such a disease or condition. RMAT designation provides all the benefits of breakthrough therapy designation, including more frequent meetings with the FDA to discuss the development plan for the product candidate and eligibility for rolling review and priority review. Product candidates granted RMAT designation may also be eligible for accelerated approval on the basis of a surrogate or intermediate endpoint reasonably likely to predict long-term clinical benefit, or reliance upon data obtained from a meaningful number of clinical trial sites, including through expansion of trials to additional sites.

Any marketing application for a drug or biologic submitted to the FDA for approval, including a product candidate with a fast track designation, RMAT designation and/or breakthrough therapy designation, may be eligible for other types of FDA programs intended to expedite the FDA review and approval process, such as priority review and accelerated approval. A product candidate is eligible for priority review if it is designed to treat a serious or life-threatening disease or condition, and if approved, would provide a significant improvement in safety or effectiveness compared to available alternatives for such disease or condition. For original BLAs, priority review designation means the FDA's goal is to take action on the marketing application within six months of the 60-day filing date (as compared to ten months under standard review). Under the accelerated approval program, the FDA may approve a BLA on the basis of either a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity, or prevalence of the condition and the availability or lack of alternative treatments. Post-marketing studies or completion of ongoing studies after marketing approval are generally required to verify the biologic's clinical benefit in relationship to the surrogate endpoint or ultimate outcome in relationship to the clinical benefit. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product. FDA may withdraw approval of a drug or indication approved under accelerated approval on an expedited basis if, for example, the sponsor fails to conduct required post-marketing trials in a timely manner or if such trials fail to verify the predicted clinical benefit of the product.

Fast Track designation, priority review, accelerated approval, RMAT designation and breakthrough therapy designation do not change the standards for approval but may expedite the development or approval process. Even if a product qualifies for one or more of these programs, the FDA may later decide that the product no longer meets the conditions for qualification or decide that the time period for FDA review or approval will not be shortened.

Orphan Drug Designation and Exclusivity

Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biologic intended to treat a rare disease or condition, defined as a disease or condition with a patient population of fewer than 200,000 individuals in the United States, or a patient population greater than 200,000 individuals in the United States and when there is no reasonable expectation that the cost of developing and making available the drug or biologic in the United States will be recovered from sales in the United States for that drug or biologic. Orphan drug designation must be requested before submitting a

BLA. After the FDA grants orphan drug designation, the generic identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA.

If a product that has orphan drug designation subsequently receives the first FDA approval for a particular active ingredient for the disease for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications, including a full BLA, to market the same biologic for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity or if the FDA finds that the holder of the orphan drug exclusivity has not shown that it can assure the availability of sufficient quantities of the orphan drug to meet the needs of patients with the disease or condition for which the drug was designated. Orphan drug exclusivity does not prevent the FDA from approving a different drug or biologic for the same disease or condition, or the same drug or biologic for a different disease or condition. Among the other benefits of orphan drug designation are tax credits for certain research and a waiver of the BLA application user fee.

A designated orphan drug may not receive orphan drug exclusivity if it is approved for a use that is broader than the indication for which it received orphan designation. In addition, orphan drug exclusive marketing rights in the United States may be lost if the FDA later determines that the request for designation was materially defective or, as noted above, if the second applicant demonstrates that its product is clinically superior to the approved product with orphan exclusivity or the manufacturer of the approved product is unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. We have obtained orphan drug designation for 4D-110 for the treatment of Chroderemia and for 4D-310 for the treatment of Fabry disease, and we plan to seek additional orphan drug designations for some or all of our product candidates in specific orphan indications in which there is a medically plausible basis for the use of these products.

Post-Approval Requirements

Biologics are subject to pervasive and continuing regulation by the FDA, including, among other things, requirements relating to record-keeping, reporting of adverse experiences, periodic reporting, product sampling and distribution, and advertising and promotion of the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims, are subject to prior FDA review and approval. There also are continuing, annual program fees for any marketed products. Biologic manufacturers and their subcontractors are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP, which impose certain procedural and documentation requirements upon us and our third-party manufacturers. Changes to the manufacturing process are strictly regulated, and, depending on the significance of the change, may require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting requirements upon us and any third-party manufacturers that we may decide to use. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain compliance with cGMP and other aspects of regulatory compliance.

The FDA may withdraw approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with manufacturing processes, or failure to comply with regulatory requirements, may result in revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical studies to assess new safety risks; or imposition of distribution restrictions or other restrictions under a REMS program. Other potential consequences include, among other things:

- restrictions on the marketing or manufacturing of the product, complete withdrawal of the product from the market or product recalls;
- fines, warning letters, or untitled letters;
- clinical holds on clinical studies;
- refusal of the FDA to approve pending applications or supplements to approved applications, or suspension or revocation of product license approvals;
- product seizure or detention, or refusal to permit the import or export of products;
- consent decrees, corporate integrity agreements, debarment or exclusion from federal healthcare programs;
- mandated modification of promotional materials and labeling and the issuance of corrective information;
- the issuance of safety alerts, Dear Healthcare Provider letters, press releases and other communications containing warnings or other safety information about the product; or
- injunctions or the imposition of civil or criminal penalties.

The FDA closely regulates the marketing, labeling, advertising and promotion of biologics. A company can make only those claims relating to safety and efficacy, purity and potency that are approved by the FDA and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses. Failure to comply with these requirements can result in, among other things, adverse publicity, warning letters, corrective advertising and potential civil and criminal penalties. Physicians may prescribe legally available products for uses that are not described in the product's labeling and that differ from those tested by us and approved by the FDA. Such off-label uses are common across medical specialties. Physicians may believe that such off-label uses are the best treatment for many patients in varied circumstances. The FDA does not regulate the behavior of physicians in their choice of treatments. The FDA does, however, restrict manufacturer's communications on the subject of off-label use of their products.

Biosimilars and Exclusivity

The Affordable Care Act, signed into law in 2010, includes a subtitle called the BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product. The FDA has issued several guidance documents outlining an approach to review and approval of biosimilars. Biosimilarity, which requires that there be no clinically meaningful differences between the biological product and the reference product in terms of safety, purity, and potency, can be shown through analytical studies, animal studies, and a clinical study or studies. Interchangeability requires that a product is biosimilar to the reference product and the product must demonstrate that it can be expected to produce the same clinical results as the reference product in any given patient and, for products that are administered multiple times to an individual, the biologic and the reference biologic may be alternated or switched

after one has been previously administered without increasing safety risks or risks of diminished efficacy relative to exclusive use of the reference biologic. However, complexities associated with the larger, and often more complex, structures of biological products, as well as the processes by which such products are manufactured, pose significant hurdles to implementation of the abbreviated approval pathway that are still being worked out by the FDA.

Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date that the reference product was first licensed by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first licensed. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing that applicant's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of its product. The BPCIA also created certain exclusivity periods for biosimilars approved as interchangeable products. At this juncture, it is unclear whether products deemed "interchangeable" by the FDA will, in fact, be readily substituted by pharmacies, which are governed by state pharmacy law.

A biological product can also obtain pediatric market exclusivity in the United States. Pediatric exclusivity, if granted, adds six months to existing exclusivity periods and patent terms. This six-month exclusivity, which runs from the end of other exclusivity protection or patent term, may be granted based on the voluntary completion of a pediatric study in accordance with an FDA-issued "Written Request" for such a study.

The BPCIA is complex and continues to be interpreted and implemented by the FDA. In addition, government proposals have sought to reduce the 12-year reference product exclusivity period. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. As a result, the ultimate impact, implementation, and impact of the BPCIA is subject to significant uncertainty.

Other Healthcare Laws

Pharmaceutical companies are subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which they conduct their business. Such laws include, without limitation, U.S. federal and state anti-kickback, fraud and abuse, false claims, pricing reporting, data privacy and security, and transparency laws and regulations as well as similar foreign laws in the jurisdictions outside the U.S. For example, the federal Anti-Kickback Statute prohibits, among other things, individuals or entities from knowingly and willfully offering, paying, soliciting or receiving remuneration, directly or indirectly, overtly or covertly, in cash or in kind to induce or in return for purchasing, leasing, ordering or arranging for or recommending the purchase, lease or order of any item or service reimbursable under Medicare, Medicaid or other federal healthcare programs. A person or entity does not need to have actual knowledge of this statute or specific intent to violate it in order to have committed a violation. In addition, the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act and the civil monetary penalties statute. The federal civil and criminal false claims laws, including the civil False Claims Act, prohibit, among other things, any individual or entity from knowingly presenting, or causing to be presented, a false claim for payment to the federal government or knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim to the federal government. The federal Health Insurance Portability and Accountability Act of 1996 (HIPAA), created additional federal civil and criminal statutes that prohibit, among other things, knowingly and willfully executing a scheme to defraud any healthcare benefit program. Similar to the U.S. federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the healthcare fraud

statute implemented under HIPAA or specific intent to violate it in order to have committed a violation. The federal Physician Payments Sunshine Act requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program, with specific exceptions, to report annually to CMS information related to payments or other transfers of value made to physicians, certain other health care professionals beginning in 2022, and teaching hospitals, and applicable manufacturers and applicable group purchasing organizations to report annually to CMS ownership and investment interests held by physicians and their immediate family members.

Similar state and local laws and regulations may also restrict business practices in the pharmaceutical industry, such as state anti-kickback and false claims laws, which may apply to business practices, including but not limited to, research, distribution, sales and marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, or by patients themselves; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government, or otherwise restrict payments that may be made to healthcare providers and other potential referral sources; state laws and regulations that require drug manufacturers to file reports relating to pricing and marketing information or which require tracking gifts and other remuneration and items of value provided to physicians, other healthcare providers and entities; state and local laws that require the registration of pharmaceutical sales representatives. Violation of any of such laws or any other governmental regulations that apply may result in significant penalties, including, without limitation, administrative civil and criminal penalties, damages, disgorgement fines, additional reporting requirements and oversight obligations, contractual damages, the curtailment or restructuring of operations, exclusion from participation in governmental healthcare programs and imprisonment.

Data Privacy and Security Laws

Pharmaceutical companies may be subject to domestic and foreign privacy, security and data breach notification laws, which are rapidly evolving in many jurisdictions worldwide. In the United States, federal and state health information laws may govern the collection, use, disclosure and protection of health-related and other personal information. HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, and regulations implemented thereunder, which impose obligations on "covered entities," including certain healthcare providers, health plans, and healthcare clearinghouses, as well as their respective "business associates" that create, receive, maintain or transmit individually identifiable health information for or on behalf of a covered entity, with respect to safeguarding the privacy, security and transmission of individually identifiable health information. State laws may be more stringent, broader in scope or offer greater individual rights with respect to protected health information (PHI) than HIPAA and state laws may differ from each other, which may complicate compliance efforts. For example, California enacted the California Consumer Privacy Act (the CCPA) on June 28, 2018, which went into effect on January 1, 2020. The CCPA gives California residents expanded rights regarding their personal information. Although CCPA contains certain exemptions for health-related information, including PHI, uncertainties over how it applies and how our treatment of non-PHI personal information may be interpreted mean that the CCPA may ultimately increase our compliance costs and potential liability. Entities that are found to be in violation of HIPAA as the result of a breach of unsecured PHI, a complaint about privacy practices or an audit by the Department of Health and Human Services (HHS) may be subject to significant civil, criminal and administrative fines and penalties and/or additional reporting and oversight obligations if required to enter into a resolution agreement and corrective action plan with HHS to settle allegations of HIPAA non-compliance.

European Union member states, the United Kingdom, Switzerland and other jurisdictions have also adopted data protection laws and regulations, which impose significant compliance obligations. In

the European Economic Area (EEA) and the United Kingdom, the collection and use of personal data, including clinical trial data, is governed by the provisions of the General Data Protection Regulation (GDPR). The GDPR became effective on May 25, 2018, and imposes strict requirements for processing the personal data of individuals within the EEA and the United Kingdom. The GDPR, together with national legislation, regulations and guidelines of the European Union and EEA member states and the United Kingdom governing the processing of personal data, impose strict obligations and restrictions on the ability to collect, analyze and transfer personal data, including health data from clinical trials and adverse event reporting. In particular, these obligations and restrictions concern the consent of the individuals to whom the personal data relates, the information provided to the individuals, the transfer of personal data out of the EEA or the United Kingdom, security breach notifications, security and confidentiality of the personal data and imposition of substantial potential fines for breaches of the data protection obligations. The law is also developing rapidly and, in July 2020, the Court of Justice of the European Union limited how organizations could lawfully transfer personal data from the EU to the U.S. European data protection authorities may interpret the GDPR and national laws differently and impose additional requirements, which add to the complexity of processing personal data in or from the EEA or United Kingdom. Guidance on implementation and compliance practices are often updated or otherwise revised.

Coverage and Reimbursement

Sales of any pharmaceutical product depend, in part, on the extent to which such product will be covered by third-party payors, such as federal, state and foreign government healthcare programs, commercial insurance and managed healthcare organizations, and the level of reimbursement for such product by third-party payors. Significant uncertainty exists as to the coverage and reimbursement status of any newly approved product, particularly for gene therapy products where the Centers for Medicare & Medicaid Services (CMS) and other third-party payors in the United States have not yet established a uniform policy of coverage and reimbursement. Therefore, decisions regarding the extent of coverage and amount of reimbursement to be provided are made on a plan-by-plan basis. One third-party payor's decision to cover a particular product does not ensure that other payors will also provide coverage for the product. As a result, the coverage determination process can require manufacturers to provide scientific and clinical support for the use of a product to each payor separately and can be a time-consuming process, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance. For products administered under the supervision of a physician, obtaining coverage and adequate reimbursement may be particularly difficult because of the higher prices often associated with such drugs. Additionally, separate reimbursement for the product itself or the treatment or procedure in which the product is used may not be available, which may impact physician utilization.

In addition, third-party payors are increasingly reducing reimbursements for pharmaceutical products and services. The U.S. government and state legislatures have continued implementing cost-containment programs, including price controls, restrictions on coverage and reimbursement and requirements for substitution of generic products. Third-party payors are more and more challenging the prices charged, examining the medical necessity and reviewing the cost effectiveness of pharmaceutical products, in addition to questioning their safety and efficacy. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit sales of any product. Decreases in third-party reimbursement for any product or a decision by a third-party payor not to cover a product could reduce physician usage and patient demand for the product.

In international markets, reimbursement and healthcare payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies. For example, the European Union provides options for its member states to restrict the range of medicinal

products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of us placing the medicinal product on the market. Pharmaceutical products may face competition from lower-priced products in foreign countries that have placed price controls on pharmaceutical products and may also compete with imported foreign products. Furthermore, there is no assurance that a product will be considered medically reasonable and necessary for a specific indication, will be considered cost-effective by third-party payors, that an adequate level of reimbursement will be established even if coverage is available or that the third-party payors' reimbursement policies will not adversely affect the ability for manufacturers to sell products profitably.

Healthcare Reform

In the United States and certain foreign jurisdictions, there have been, and we expect there will continue to be, a number of legislative and regulatory changes to the healthcare system. In March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act (collectively the ACA) was signed into law, which substantially changed the way healthcare is financed by both governmental and private insurers in the United States. The ACA contains a number of provisions, including those governing enrollment in federal healthcare programs, reimbursement adjustments and fraud and abuse changes. Additionally, the ACA increased the minimum level of Medicaid rebates payable by manufacturers of brand name drugs from 15.1% to 23.1%; required collection of rebates for drugs paid by Medicaid managed care organizations; imposed a non-deductible annual fee on pharmaceutical manufacturers or importers who sell certain "branded prescription drugs" to specified federal government programs, implemented a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted, or injected; expanded eligibility criteria for Medicaid programs; created a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research; and established a Center for Medicare & Medicaid Innovation at CMS to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending.

Since its enactment, there have been judicial and Congressional challenges to certain aspects of the ACA, and we expect there will be additional challenges and amendments to the ACA in the future. For example, in 2017, Congress enacted the Tax Cuts and Jobs Act, which eliminated the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate." On December 14, 2018, a U.S. District Court Judge in the Northern District of Texas (the Texas District Court Judge), ruled that the individual mandate is a critical and inseparable feature of the ACA, and therefore, because it was repealed as part of the Tax Cuts and Jobs Act, the remaining provisions of the ACA are invalid as well. On March 2, 2020, the U.S. Supreme Court granted the petitions for writs of certiorari to review the case, although it is unclear when a decision will be made or how the Supreme Court will rule. It is also unclear how other efforts to challenge, repeal or replace the ACA will impact the ACA.

Other legislative changes have been proposed and adopted since the ACA was enacted, including aggregate reductions of Medicare payments to providers of 2% per fiscal year and reduced payments to several types of Medicare providers, which will remain in effect through 2030, with the exception of a temporary suspension from May 1, 2020 through December 31, 2020, absent additional congressional action.

Moreover, there has recently been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which has resulted in several Congressional

inquiries and proposed and enacted legislation designed, among other things, to bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs and reform government program reimbursement methodologies for pharmaceutical products. On March 10, 2020, the Trump administration sent “principles” for drug pricing to Congress, calling for legislation that would among other things, cap Medicare Part D beneficiary out-of-pocket pharmacy expenses, provide an option to cap Medicare Part D beneficiary monthly out-of-pocket expenses, and place limits on pharmaceutical price increases. Additionally, the Trump administration’s budget proposal for the fiscal year 2021 includes a \$135 billion allowance to support legislative proposals seeking to reduce drug prices, increase competition, lower out-of-pocket drug costs for patients, and increase patient access to lower-cost generic and biosimilar drugs. Further, on July 24, 2020, the Trump administration announced four executive orders related to prescription drug pricing that attempt to implement several of the administration’s proposals. While some existing measures may require additional authorization to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs.

Individual states in the United States have also become increasingly active in implementing regulations designed to control pharmaceutical product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures and, in some cases, mechanisms to encourage importation from other countries and bulk purchasing. Furthermore, there has been increased interest by third-party payors and governmental authorities in reference pricing systems and publication of discounts and list prices.

Employees and Human Capital

As of September 30, 2020, we had 78 full-time employees. Of these employees, 56 are engaged in research and development. Our employees are not represented by labor unions or covered by collective bargaining agreements. We consider our relationship with our employees to be good.

Our human capital resources objectives include, as applicable, identifying, recruiting, retaining, incentivizing and integrating our existing and additional employees. The principal purposes of our equity incentive plans are to attract, retain and motivate selected employees, consultants and directors through the granting of stock-based compensation awards and cash-based performance bonus awards.

Facilities

We lease approximately 51,000 square feet of office and laboratory space in Emeryville, California under leases that expire in September 2026 and December 2029. We believe that our facilities are adequate to meet our current needs, and that suitable additional alternative spaces will be available in the future on commercially reasonable terms, if required.

Legal Proceedings

We are not currently a party to any material legal proceedings. We may, however, in the ordinary course of business face various claims brought by third parties and we may, from time to time, make claims or take legal actions to assert our rights, including intellectual property rights as well as claims relating to employment matters and the safety or efficacy of our products. Any of these claims could subject us to costly litigation and, while we generally believe that we have adequate insurance to cover many different types of liabilities, our insurance carriers may deny coverage, may be inadequately capitalized to pay on valid claims, or our policy limits may be inadequate to fully satisfy any damage awards or settlements. If this were to happen, the payment of any such awards could have a material adverse effect on our operations, cash flows and financial position. Additionally, any such claims, whether or not successful, could damage our reputation and business.

MANAGEMENT**Executive Officers and Directors**

The following table sets forth information regarding our executive officers and directors as of November 13, 2020:

<u>Name</u>	<u>Age</u>	<u>Position(s)</u>
Executive Officers and Employee Directors		
David Kirn, M.D.	58	Chief Executive Officer and Director
August Moretti	70	Chief Financial Officer
Theresa Janke	46	Chief Strategy Officer
Peter Francis, M.D., Ph.D.	52	Chief Scientific Officer
Fred Kamal, Ph.D.	58	Chief Operating Officer and Chief Technical Officer
Robert Fishman, M.D.	58	Chief Medical Officer
Non-Employee Directors		
John F. Milligan, Ph.D.	59	Executive Chairman
William Burkoth, MBA(1)(2)	44	Director
Jacob Chacko, M.D., MBA(2)	42	Director
Susannah Gray, MBA(1)(2)	60	Director
Nancy Miller-Rich(1)(4)	61	Director
David Schaffer, Ph.D.(3)(4)	49	Director and Chief Scientific Advisor
Charles Theuer, M.D., Ph.D.(2)(3)(4)	57	Director
Shawn Cline Tomasello, MBA(1)(3)	62	Director
Tony Yao, M.D., Ph.D.(1)(4)	48	Director

- (1) Member of compensation committee.
(2) Member of audit committee.
(3) Member of nominating and corporate governance committee.
(4) Member of the science and technology committee.

Executive Officers and Employee Directors

David Kirn, M.D., is our co-founder and has served as our Chief Executive Officer and served on our board of directors since our inception in 2013. Dr. Kirn previously served as the Executive Chairman of our board until August 2020 when John Milligan, Ph.D. assumed the position. Dr. Kirn is an Adjunct Professor of Bioengineering at U.C. Berkeley. He previously served as Executive Chairman of the board of Ignite Immunotherapy Inc., where he was a co-founder. Dr. Kirn held senior development positions at Onyx Pharmaceuticals and Celgene, and he was a senior advisor on viral vector gene therapeutics and cancer immunotherapy for over 10 years with numerous companies, including Biogen Idec, Novartis, Cell Genesys, Pfizer and Bayer. Dr. Kirn received a B.A. in Physiology (Departmental Citation; Phi Beta Kappa) from U.C. Berkeley in 1985, an M.D. (Alpha Omega Alpha) from U.C. San Francisco Medical School in 1989 and completed internal medicine residency training at Harvard Medical School, Brigham and Women's Hospital (including a term as Chief Medical Resident at affiliated VA hospital). He has also completed hematology-oncology and clinical research fellowships at U.C. San Francisco and completed a certificate of business excellence from the Haas Business School at U.C. Berkeley. In 2013, he was awarded the Johnson & Johnson Entrepreneur Innovator award from the J&J Innovation Center. We believe that Dr. Kirn is qualified to serve as a member of our board of directors based on his perspective and the experience he brings as one of our founders and Chief Executive Officer, and because of his extensive experience at other life science companies.

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August Moretti has served as our Chief Financial Officer since January 2019. Mr. Moretti previously served as Chief Financial Officer at Assertio Therapeutics (formerly Depomed, Inc.), a publicly held specialty pharmaceuticals company focused in pain and neurology, from January 2012 until August 2018. From 2004 to December 2011, Mr. Moretti served as Chief Financial Officer and Senior Vice President of Alexza Pharmaceuticals, Inc., a publicly-held pharmaceutical company. From 2001 to 2004, Mr. Moretti served as Chief Financial Officer and General Counsel of Alavita, Inc., a privately held personalized medicine company. From 1982 to 2000 Mr. Moretti was a partner in an international law firm. Mr. Moretti received his B.A. in Economics from Princeton University in 1972. He received his J.D. from Harvard Law School in 1975.

Theresa Janke is a co-founder and has served in positions of increasing responsibility since our inception. She served as our Chief Operating Officer from April 2018 until February 2020, at which point she began serving as our Chief Strategy Officer. Ms. Janke previously served in various consulting roles in 2013-2014 including: Senior Director of Corporate Projects & Alliance Management at SillaJen, Inc. (formerly Jennerex Biotherapeutics Inc.), a biotech company focused on engineering and developing oncolytic immunotherapeutics, and Director, Clinical Research & Development—Strategy and Alliances at Celgene Corporation, a global biopharmaceutical company. Prior to that, she served in positions of increasing responsibility, including Director of Clinical Operations, at Jennerex Biotherapeutics Inc., an oncolytic immunotherapy biotech company, from 2007 through 2013. She was a co-founder and served on the board of directors of Ignite Immunotherapy Inc., a private biotech company focused on oncolytic cancer vaccine discovery and development. Ms. Janke received a B.S. in Biopsychology from the U.C. Santa Barbara in 1996.

Peter Francis, M.D., Ph.D., has served as our Chief Scientific Officer since February 2020. Dr. Francis previously served as our Chief Medical Officer from January 2019 to February 2020 and as our Senior Vice President, Clinical Translational R&D, and Retina Therapeutic Area Head from August 2018 to January 2019. Dr. Francis previously served as Chief Medical Officer at RetroSense Therapeutics from February 2012 until August 2016 when it was purchased by Allergan Inc. Dr. Francis practices as a physician at Orion Eye Center. Dr. Francis received his B.Sc. in Molecular Cell Biology from the University of Southampton, England in 1991. He earned his M.D. from the University of Southampton, England in 1992. He earned his Ph.D. in ophthalmic genetics from University College, London in 2000.

Fred Kamal, Ph.D., has served as our Chief Operating Officer since February 2020 and has served as our Chief Technical Officer since October 2018. Dr. Kamal previously served as Senior Vice President of Quality and Regulatory CMC for AveXis Inc., a gene therapy company, from May 2017 through August 2018. Prior to AveXis, Dr. Kamal served as the Vice President of Quality for Juno Therapeutics from May 2015 through April 2017 and prior to that Dr. Kamal served as the Vice President of Quality and Regulatory CMC for Intermune Inc. from January 2013 through March 2015. Dr. Kamal received his B.S. in Chemistry from San Jose State University in 1986. Dr. Kamal received his M.Sc. in Chemistry from The American University in 2000. He received his Ph.D. in Chemistry from The American University in 2003.

Robert Fishman, M.D., has served as our Chief Medical Officer since October 2020. He previously served as the Chief Medical Officer of Xoc Pharmaceuticals, Inc., a private biopharmaceutical company, from February 2019 to October 2020. Prior to that, he served as the Chief Medical Officer of Corcept Therapeutics, a publicly traded biotechnology company, from September 2015 to January 2019. Dr. Fishman received his undergraduate degree in Biology from Harvard University in 1982, and his M.D. from Stanford University School of Medicine in 1986.

Non-Employee Directors

John F. Milligan, Ph.D. has served as Executive Chairman of our board of directors since August 2020. Dr. Milligan previously served as the President and Chief Executive Officer of Gilead Sciences, Inc. from May 2008 and March 2016, respectively, until February 2019, and spent a total of 29 years at Gilead in various roles since 1990. Prior to joining Gilead, Dr. Milligan was a postdoctoral research fellow at the University of California San Francisco Medical Center. Dr. Milligan has served on the board of directors of Pacific Biosciences of California since July 2013, and also serves as the Chair of the Board of Trustees of Ohio Wesleyan University. Dr. Milligan received his B.A. in Chemistry from Ohio Wesleyan University in 1983 and his Ph.D. from the University of Illinois at Urbana-Champaign in 1988. We believe Dr. Milligan is qualified to serve as a member of our board of directors based on his extensive experience and leadership roles in the biopharmaceutical industry.

William Burkoth, MBA, has served as a member of our board of directors since March 2019. Mr. Burkoth has served on the venture investments team of Pfizer Inc. since 2004 and is currently Executive Director at Pfizer Inc. and Senior Partner at Pfizer Ventures. Mr. Burkoth worked in business development at Galileo Pharmaceuticals, Inc. and at IntraBiotics Pharmaceuticals, Inc. from 2002 to 2004. Mr. Burkoth worked as an analyst at Bay City Capital, a life sciences venture capital firm, from 1999 to 2002. He previously served on the board of directors of the following publicly-held company: NovoCure Limited from July 2009 to May 2019. Mr. Burkoth received a B.A. in Chemistry from Whitman College in 1999 and an M.B.A. from Columbia Business School in 2011. We believe Mr. Burkoth is qualified to serve as a member of our board of directors based on his finance background and his extensive investment experience in the life science industry.

Jacob Chacko, M.D., MBA, has served as a member of our board of directors since March 2019. Dr. Chacko has served as Chief Executive Officer of ORIC Pharmaceuticals, Inc., a clinical-stage oncology company focused on discovery and development of novel therapies against treatment-resistant cancers, since May 2018. Prior to ORIC, Dr. Chacko served as Chief Financial Officer of Ignyta, Inc., a publicly traded precision oncology company, from May 2014 until February 2018 when Ignyta was acquired by Roche Holdings, Inc. Prior to Ignyta, Dr. Chacko was an investor at TPG Capital from August 2008 until May 2014. From 2002 until 2003, Dr. Chacko was a consultant serving healthcare clients at McKinsey & Company. Dr. Chacko currently serves on the board of directors of Turning Point Therapeutics, Inc., a publicly-traded biotechnology company, from November 2018. Dr. Chacko served on the board of directors of RentPath Inc., a digital media company, from 2011 until 2014, Envision Pharmaceutical Services, LLC from 2013 until 2014, Bonti, Inc., a biotechnology company, from February 2018 until October 2018 and the Packard Children's Health Alliance at the Lucile Packard Children's Hospital Stanford from 2013 until June 2017. Dr. Chacko currently chairs the Western Regional Selection Committee for the Marshall Scholarship. Dr. Chacko concurrently received his M.D. from the U.C. Los Angeles and his M.B.A. from Harvard Business School. Dr. Chacko received a M.Sc. from Oxford University as a Marshall Scholar. We believe Dr. Chacko is qualified to serve as a member of our board of directors based on his medical and finance background, his experience in investing in life science companies and his service on the boards of public and private companies.

Susannah Gray, MBA, has served as a member of our board of directors since July 2020. Ms. Gray served as the Executive Vice President of Finance and Strategy of Royalty Pharma Management, LLC, a buyer of pharmaceutical royalties and a funder across the biopharmaceutical industry, and in various other similar roles from 2005 until 2019. Prior to Royalty Pharma, Ms. Gray served as a managing director and senior analyst covering the healthcare sector of CIBS World Market's high yield group from 2002 to 2004, and also previously served in similar roles at Merrill Lynch and Chase Securities, Inc. (predecessor of JP Morgan Securities, Inc.). Ms. Gray currently serves on the board of directors of Susan G. Komen and serves on the Board of Trustees of Wesleyan

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University. Ms. Gray received a B.A. from Wesleyan University in 1982 and an M.B.A. from Columbia University in 1990. We believe Ms. Gray is qualified to serve as a member of our board of directors based on her experience in corporate finance and capital markets and previous experience in investment banking covering the healthcare sector.

Nancy Miller-Rich, has served as a member of our board of directors since November 2020. She has served as a consultant and advisor to various pharmaceutical and biotechnology companies since September 2017. Previously, Ms. Miller-Rich served in a number of leadership roles at Merck & Co., Inc. and, prior to the merger of the two companies, at Schering-Plough Corporation, including most recently as Senior Vice President, Global Human Health Business Development & Licensing, Strategy and Commercial Support from November 2013 to September 2017 and as Group Vice President, Consumer Care Global New Ventures and Strategic Commercial Development from January 2007 to November 2013. Prior to joining Schering-Plough in 1990, Ms. Miller-Rich served in a variety of commercial and marketing roles at Sandoz Pharmaceuticals and Sterling Drug, Inc. Ms. Miller-Rich has served on the board of directors of several publicly-traded biotechnology companies, such as Intercept Pharmaceuticals, Inc. since April 2018, Aldeyra Therapeutics, Inc. since January 2020, and Kadmon Holdings, Inc. since October 2020. She received her undergraduate degree in Business Administration, Marketing, from Ithaca College in New York in 1981. We believe Ms. Miller-Rich is qualified to serve as a member of our board of directors based on her extensive experience as a director of publicly traded biotechnology companies.

David Schaffer, Ph.D. is our co-founder and has served as our Chief Scientific Advisor and a member of our board of directors since our inception in 2013. Dr. Schaffer has served as a Professor of Chemical and Biomolecular Engineering, Bioengineering, Molecular and Cell Biology, and the Helen Wills Neuroscience Institute at the U.C. Berkeley since 1999 and has served as the Director of the Berkeley Stem Cell Center since 2011. He previously served on the board of directors of uniQure NV, a publicly held company, from January 2014 to June 2020. Dr. Schaffer received a B.S. in Chemical Engineering from Stanford University in 1993. He earned his Ph.D. in Chemical Engineering from the Massachusetts Institute of Technology in 1998. We believe Dr. Schaffer is qualified to serve as a member of our board of directors based on his perspective and the experience he brings as one of our founders, and because of his scientific expertise and leading work in directed evolution.

Charles Theuer, M.D., Ph.D., has served as a member of our board of directors since December 2015. Dr. Theuer has served as President and Chief Executive Officer at Tracon Pharmaceuticals, Inc., since June 2006. He previously served as Chief Medical Officer at TargeGen, Inc. until June 2006. He currently serves on the board of directors of the following publicly-held companies: Tracon Pharmaceuticals Inc., since June 2006 and Oncernal Therapeutics Inc. since May 2018, where he serves on the Science and Development and Nominating and Corporate Governance committees. Dr. Theuer received a B.S. in Life Sciences from the Massachusetts Institute of Technology in 1985. He received his M.D. from U.C. San Francisco in 1989. He received his Ph.D. in Environmental Health Science from U.C. Irvine in 2002. We believe that Dr. Theuer is qualified to serve as a member of our board of directors based on his medical and scientific background and because of his experience in leading and serving on the boards of public and private life science companies.

Shawn Cline Tomasello, MBA, has served as a member of our board of directors since November 2020. She served as Chief Commercial Officer of Kite Pharma from December 2015 to July 2018. Before that, Ms. Tomasello served as the Chief Commercial Officer of Commercial and Medical Affairs at Pharmacyclics, LLC from August 2014 to August 2015. She has served on the boards of several publicly traded biotechnology companies including UroGen Pharma since July 2018, Mesoblast Ltd. since July 2018 and Gamida-Cell Ltd. since March 2019. Ms. Tomasello received her undergraduate degree in marketing from the University of Cincinnati in 1982 and her MBA from Murray State University in Kentucky in 1989. We believe Ms. Tomasello is qualified to serve as a member of our

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board of directors based on her extensive experience in building successful commercial operations for biopharmaceutical companies and her experience as a director of publicly traded life science companies.

Tony Yao, M.D., Ph.D. has served as a member of our board of directors since August 2018. Dr. Yao has served as portfolio manager of life science strategy at ArrowMark Partners since April 2012. He previously served as an equity analyst at Janus Capital Group until March 2012. He currently serves on the board of directors of the following publicly-held company: Precision Biosciences since June 2018, where he serves on the compensation and audit committee. Dr. Yao received a B.S. in biochemistry from Brown University in 1994. He earned an M.D. and a Ph.D. in Immunology from Stanford University in 2002. We believe that Dr. Yao is qualified to serve as a member of our board of directors based on his scientific background and his extensive experience in investing in life science companies.

Family Relationships

There are no family relationships among any of our executive officers or directors.

Board Composition

Director Independence

Our board of directors currently consists of 10 members. Our board of directors has determined that all of our directors, other than Dr. Kirn, qualify as "independent" directors in accordance with the Nasdaq Global Market listing requirements. Dr. Kirn is not considered independent because he is an employee. The Nasdaq Global Market's independence definition includes a series of objective tests, such as that the director is not, and has not been for at least three years, one of our employees and that neither the director nor any of his or her family members has engaged in various types of business dealings with us. In addition, as required by the Nasdaq Global Market rules, our board of directors has made a subjective determination as to each independent director that no relationships exist that, in the opinion of our board of directors, would interfere with the exercise of independent judgment in carrying out the responsibilities of a director. In making these determinations, our board of directors reviewed and discussed information provided by the directors and us with regard to each director's business and personal activities and relationships as they may relate to us and our management. There are no family relationships among any of our directors or executive officers.

Classified Board of Directors

In accordance with our amended and restated certificate of incorporation to be in effect immediately prior to the consummation of this offering, our board of directors will be divided into three classes with staggered, three-year terms. At each annual meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting following election. Effective upon the consummation of this offering, we expect that our directors will be divided among the three classes as follows:

- the Class I directors will be Mr. Burkoth and Drs. Kirn, Schaffer and Yao, and their terms will expire at the annual meeting of stockholders to be held in 2021;
- the Class II directors will be Ms. Gray, Drs. Chacko and Theuer, and their terms will expire at the annual meeting of stockholders to be held in 2022; and
- the Class III directors will be Dr. Milligan, Mses. Miller-Rich and Tomasello, and their terms will expire at the annual meeting of stockholders to be held in 2023.

Our amended and restated certificate of incorporation will provide that the authorized number of directors may be changed only by resolution of our board of directors. Any additional directorships

resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the directors. The division of our board of directors into three classes with staggered three-year terms may delay or prevent a change of our board of directors or a change in control.

Voting Arrangements

The election of the members of our board of directors is governed by the Third Amended and Restated Investors' Rights Agreement, dated as of April 29, 2020, that we entered into with certain holders of our common stock and certain holders of our redeemable convertible preferred stock (the Investors' Rights Agreement) and the related provisions of our amended and restated certificate of incorporation.

Pursuant to the Investors' Rights Agreement, the holders of our common stock and redeemable convertible preferred stock who are parties to the Investors' Rights Agreement are obligated to vote for the election of certain designees of our board of directors which are as follows:

- one member designated by Pfizer, for which Mr. Burkoth has been designated;
- one member designated by the holders of a majority of our Series B redeemable convertible preferred stock, voting exclusively and as a separate class, for which Dr. Yao has been designated;
- one member designated by the holders of a majority of our Series C redeemable convertible preferred stock, voting exclusively as a separate class, for which Dr. Milligan has been designated;
- two members designated by the holders of a majority of our common stock (other than any common stock issued or issuable upon the conversion of the redeemable convertible preferred stock), voting exclusively and together as a single class, for which Dr. Kim and Dr. Shaffer have been designated; and
- three members, who are not otherwise affiliated with any of our investors, the first of whom shall be mutually agreed upon by a majority of the other members of our board of directors, for which Ms. Gray has been designated; the second of whom shall be proposed by our management subject to the approval of a majority of the members of our board of directors, for which Dr. Theuer has been designated; and the third of whom shall be an individual that satisfies the independence, financial literacy and financial expertise requirements to serve as an audit committee chairperson pursuant to relevant SEC and Nasdaq laws and regulations, and mutually acceptable to a majority of the other members of our board of directors, for which Dr. Chacko has been designated.

The above provisions of Investors' Rights Agreement will terminate upon the consummation of this offering and our amended and restated certificate of incorporation will be amended and restated, after which there will be no further contractual obligations or charter provisions regarding the election of our directors. Our directors hold office until their successors have been elected and qualified or appointed, or the earlier of their death, resignation or removal.

Leadership Structure of our Board

Our amended and restated bylaws and corporate governance guidelines will provide our board of directors with flexibility to combine or separate the positions of Chairman of our board of directors and Chief Executive Officer and to implement a lead director in accordance with its determination that utilizing one or the other structure would be in our best interest. Dr. Milligan currently serves as the Executive Chairman of our board of directors. In that role, Dr. Milligan presides over the executive sessions of our board of directors and as a liaison between management and our board of directors.

Our board of directors has concluded that our current leadership structure is appropriate at this time. However, our board of directors will continue to periodically review our leadership structure and may make such changes in the future as it deems appropriate.

Role of our Board in Risk Oversight Process

Risk assessment and oversight are an integral part of our governance and management processes. Our board of directors encourages management to promote a culture that incorporates risk management into our corporate strategy and day-to-day business operations. Management discusses strategic and operational risks at regular management meetings, and conducts specific strategic planning and review sessions during the year that include a focused discussion and analysis of the risks facing us. Throughout the year, senior management reviews these risks with our board of directors at regular board meetings as part of management presentations that focus on particular business functions, operations or strategies, and presents the steps taken by management to mitigate or eliminate such risks.

Our board of directors does not have a standing risk management committee, but rather administers this oversight function directly through our board of directors as a whole, as well as through various standing committees of our board of directors that address risks inherent in their respective areas of oversight. While our board of directors is responsible for monitoring and assessing strategic risk exposure, our audit committee is responsible for overseeing our major financial risk exposures and the steps our management has taken to monitor and control these exposures. The audit committee also monitors compliance with legal and regulatory requirements and considers and approves or disapproves any related person transactions. Our nominating and corporate governance committee monitors the effectiveness of our corporate governance guidelines. Our compensation committee assesses and monitors whether any of our compensation policies and programs has the potential to encourage excessive risk-taking.

Board Committees

Our board of directors has the following standing committees: an audit committee, a compensation committee, a nominating and corporate governance committee and a science and technology committee. Our board of directors may establish other committees to facilitate the management of our business. The composition and functions of each committee are described below.

Audit Committee

Our audit committee oversees our corporate accounting and financial reporting process. Among other matters, the audit committee:

- appoints our independent registered public accounting firm;
- evaluates the independent registered public accounting firm's qualifications, independence and performance;
- determines the engagement of the independent registered public accounting firm;
- reviews and approves the scope of the annual audit and pre-approves the audit and non-audit fees and services;
- reviews and approves all related party transactions on an ongoing basis;
- establishes procedures for the receipt, retention and treatment of complaints received by us regarding accounting, internal accounting controls or auditing matters

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- discusses with management and the independent registered public accounting firm the results of the annual audit and the review of our quarterly financial statements;
- approves the retention of the independent registered public accounting firm to perform any proposed permissible non-audit services;
- monitors the rotation of partners of the independent registered public accounting firm on our engagement team in accordance with requirements established by the SEC;
- discusses on a periodic basis, or as appropriate, with management our policies and procedures with respect to risk assessment and risk management;
- is responsible for reviewing our financial statements and our management's discussion and analysis of financial condition and results of operations to be included in our annual and quarterly reports to be filed with the SEC;
- annually reviews and assesses internal controls and treasury functions including cash management procedures;
- investigates any reports received through the ethics helpline and report to our board of directors periodically with respect to the information received through the ethics helpline and any related investigations;
- reviews our critical accounting policies and estimates; and
- reviews the audit committee charter and the committee's performance at least annually.

Effective upon the consummation of this offering, the members of our audit committee will be Mr. Burkoth, Dr. Chacko, Ms. Gray and Dr. Theuer. Dr. Chacko will serve as the chairperson of the committee. All members of our audit committee will meet the requirements for financial literacy under the applicable rules and regulations of the SEC and the Nasdaq Global Market. Our board of directors will have determined that Dr. Chacko is an audit committee financial expert as defined under the applicable rules of the SEC and has the requisite financial sophistication as defined under the applicable rules and regulations of The Nasdaq Global Market. Under the rules of the SEC, members of the audit committee must also meet heightened independence standards. Our board of directors will have determined that each of Mr. Burkoth, Dr. Chacko, Ms. Gray and Dr. Theuer are independent under the applicable rules of the SEC and The Nasdaq Global Market. The audit committee will operate under a written charter that satisfies the applicable standards of the SEC and the Nasdaq Global Market.

Compensation Committee

Our compensation committee oversees policies relating to compensation and benefits of our officers and employees. The compensation committee reviews and approves or recommends corporate goals and objectives relevant to compensation of our executive officers (other than our Chief Executive Officer), evaluates the performance of these officers in light of those goals and objectives and approves the compensation of these officers based on such evaluations. The compensation committee also reviews and approves or makes recommendations to our board of directors regarding the issuance of stock options and other awards under our stock plans to our executive officers (other than our Chief Executive Officer). The compensation committee reviews the performance of our Chief Executive Officer and makes recommendations to our board of directors with respect to his compensation and our board of directors retains the authority to make compensation decisions relative to our Chief Executive Officer. The compensation committee will review and evaluate, at least annually, the performance of the compensation committee and its members, including compliance by the compensation committee with its charter.

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Effective upon the consummation of this offering, the members of our compensation committee will be Mr. Burkoth, Ms. Gray, Ms. Miller-Rich, Ms. Tomasello and Dr. Yao. Ms. Gray will serve as the chairman of the committee. Each of the members of our compensation committee will be independent under the applicable rules and regulations of the Nasdaq Global Market, will be a “non-employee director” as defined in Rule 16b-3 promulgated under the Exchange Act and will be an “outside director” as that term is defined in Section 162(m) of the U.S. Internal Revenue Code of 1986, as amended (Section 162(m)). The compensation committee will operate under a written charter that satisfies the applicable standards of the SEC and the Nasdaq Global Market.

Nominating and Corporate Governance Committee

The nominating and corporate governance committee is responsible for making recommendations to our board of directors regarding candidates for directorships and the size and composition of our board of directors. In addition, the nominating and corporate governance committee is responsible for overseeing our corporate governance policies and reporting and making recommendations to our board of directors concerning governance matters.

Effective upon the consummation of this offering, the members of our nominating and corporate governance committee will be Dr. Schaffer, Dr. Theuer and Ms. Tomasello. Dr. Theuer will serve as the chairman of the committee. Each of the members of our nominating and corporate governance committee will be an independent director under the applicable rules and regulations of the Nasdaq Global Market relating to nominating and corporate governance committee independence. The nominating and corporate governance committee will operate under a written charter that satisfies the applicable standards of the SEC and the Nasdaq Global Market.

Science and Technology Committee

Our science and technology committee reviews, evaluates and advises the board of directors on the overall strategy, direction and effectiveness of our technology and research and development activities, monitors and evaluates trends in technologies relevant to our present and future business and evaluates and advises the board of directors and management on the soundness, opportunities and risks associated with the products, programs and technologies in which we are or may be considering investing our research and development efforts. The science and technology committee reports regularly to the board of directors and will periodically evaluate its own performance.

Effective upon the consummation of this offering, the members of the science and technology committee will be Ms. Miller-Rich, Dr. Theuer, Dr. Schaffer and Dr. Yao. Dr. Schaffer will serve as the chair of the committee.

Compensation Committee Interlocks and Insider Participation

None of the members of the compensation committee is currently, or has been at any time, one of our executive officers or employees. None of our executive officers currently serves, or has served during the last year, as a member of the board of directors or compensation committee of any entity that has one or more executive officers serving as a member of our board of directors or on our compensation committee.

Board Diversity

Upon consummation of this offering, our nominating and corporate governance committee will be responsible for reviewing with our board of directors, on an annual basis, the appropriate characteristics, skills and experience required for our board of directors as a whole and its individual

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members. In evaluating the suitability of individual candidates (both new candidates and current members), the nominating and corporate governance committee, in recommending candidates for election, and our board of directors, in approving (and, in the case of vacancies, appointing) such candidates, may take into account many factors, including but not limited to the following:

- personal and professional integrity;
- ethics and values;
- experience in corporate management, such as serving as an officer or former officer of a publicly held company;
- experience in the industries in which we compete;
- experience as a board member or executive officer of another publicly held company;
- diversity of expertise and experience in substantive matters pertaining to our business relative to other board members;
- conflicts of interest; and
- practical and mature business judgment.

Currently, our board of directors evaluates, and following the consummation of this offering will evaluate, each individual in the context of our board of directors as a whole, with the objective of assembling a group that can best maximize the success of the business and represent stockholder interests through the exercise of sound judgment using its diversity of experience in these various areas.

Code of Business Conduct and Ethics

Prior to the consummation of this offering, we will adopt a code of business conduct and ethics that will apply to all of our employees, officers and directors, including those officers responsible for financial reporting. Following the consummation of this offering, the code of business conduct and ethics will be available on our website. We expect that any amendments to the code, or any waivers of its requirements, will be disclosed on our website.

Limitation on Liability and Indemnification Matters

Our amended and restated certificate of incorporation, which will become effective immediately prior to the consummation of this offering, will contain provisions that limit the liability of our directors for monetary damages to the fullest extent permitted by Delaware law. Consequently, our directors will not be personally liable to us or our stockholders for monetary damages for any breach of fiduciary duties as directors, except liability for:

- any breach of the director's duty of loyalty to us or our stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the Delaware General Corporation Law; or
- any transaction from which the director derived an improper personal benefit.

Each of our amended and restated certificate of incorporation and amended and restated bylaws, which will become effective immediately prior to the consummation of this offering, will provide that we are required to indemnify our directors and officers, in each case to the fullest extent permitted by

Delaware law. Our amended and restated bylaws will also obligate us to advance expenses incurred by a director or officer in advance of the final disposition of any action or proceeding, and permit us to secure insurance on behalf of any officer, director, employee or other agent for any liability arising out of his or her actions in that capacity regardless of whether we would otherwise be permitted to indemnify him or her under Delaware law. We have entered and expect to continue to enter into agreements to indemnify our directors, executive officers and other employees as determined by our board of directors. With specified exceptions, these agreements provide for indemnification for related expenses including, among other things, attorneys' fees, judgments, fines and settlement amounts incurred by any of these individuals in any action or proceeding. We believe that these bylaw provisions and indemnification agreements are necessary to attract and retain qualified persons as directors and officers. We also maintain directors' and officers' liability insurance.

The limitation of liability and indemnification provisions in our amended and restated certificate of incorporation and amended and restated bylaws may discourage stockholders from bringing a lawsuit against our directors and officers for breach of their fiduciary duty. They may also reduce the likelihood of derivative litigation against our directors and officers, even though an action, if successful, might benefit us and our stockholders. Further, a stockholder's investment may be adversely affected to the extent that we pay the costs of settlement and damages.

Director Compensation

Historically, we have not had a formalized non-employee director compensation program. However, we have generally adopted a practice of paying director fees of \$35,000 per year, which we recently increased to \$40,000 per year, and issuing options to purchase shares of our common stock targeted at certain percentages of our fully diluted capitalization to our independent directors. We paid director fees in the amount of \$35,000 to both of our independent directors, Dr. Theuer and Dr. Chacko, for their board service in fiscal year 2019, although Dr. Chacko's amount was pro-rated for his partial service in 2019 starting in March 2019. In addition, during March 2019, we issued to Dr. Theuer an option to purchase 22,500 shares of our common stock, with per share exercise price of \$9.41, which vested as to 100% of its shares in March 2020, subject to Dr. Theuer's continued service to us through such date. In addition, during March 2019, we issued to Dr. Chacko an option to purchase 37,500 shares of our common stock, with per share exercise price of \$9.41, which vested as to one-third of the shares in March 2020 and as to 1/36th of the aggregate shares in substantially equal monthly installments thereafter, subject to Dr. Chacko's continued service to us through the applicable vesting date. All unvested options accelerate in full on a change in control. We did not make any other equity grants to our non-employee directors in 2019. In addition, we paid consulting fees in the amount of \$50,000 to Dr. Schaffer for research services he provided to us in addition to his service as a member of the board of directors, and we increased Dr. Schaffer's consulting fees to \$85,000 per year beginning July 1, 2020. We paid Dr. Schaffer a one-time bonus of \$25,000 for his services in connection with our Series C financing. We also provide reimbursement to our non-employee directors for their reasonable expenses incurred in attending meetings of our board of directors and committees of our board of directors.

In August 2020, we entered into a letter agreement with John Milligan, Ph.D. to serve as a member of our board and its Executive Chairman. Under such letter agreement, Dr. Milligan is eligible to receive an annual cash retainer of \$150,000, reimbursement of legal fees incurred in negotiating the letter agreement up to \$15,000 and was granted an option to purchase 335,243 shares of our common stock. The option will vest as to 25% of the shares on August 17, 2021 and as to 1/48th of the aggregate shares in substantially equal monthly installments thereafter, subject to Dr. Milligan's continued service to us through the applicable vesting date. Any unvested shares subject to the option will accelerate in full on a change in control.

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In July 2020, we entered into a letter agreement with Susannah Gray to serve as a member of our board. Under such letter agreement, Ms. Gray is eligible to receive an annual cash retainer of \$40,000 and was granted an option to purchase 45,000 shares of our common stock. The option will vest as to 33% of the shares on July 20, 2021 and as to 1/36th of the aggregate shares in substantially equal monthly installments thereafter, subject to Ms. Gray's continued service to us through the applicable vesting date. Any unvested shares subject to the option will accelerate in full on a change in control.

We have approved a compensation policy for our non-employee directors, or the Director Compensation Program, to be effective in connection with the consummation of this offering. Pursuant to the Director Compensation Program, our non-employee directors will receive cash compensation as follows:

- Each non-employee director will receive an annual cash retainer in the amount of \$40,000 per year.
- The chairperson of the audit committee will receive additional annual cash compensation in the amount of \$20,000 per year for such chairperson's service on the audit committee. Each non-chairperson member of the audit committee will receive additional annual cash compensation in the amount of \$10,000 per year for such member's service on the audit committee.
- The chairperson of the compensation committee will receive additional annual cash compensation in the amount of \$15,000 per year for such chairperson's service on the compensation committee. Each non-chairperson member of the compensation committee will receive additional annual cash compensation in the amount of \$7,500 per year for such member's service on the compensation committee.
- The chairperson of the nominating and corporate governance committee will receive additional annual cash compensation in the amount of \$10,000 per year for such chairperson's service on the nominating and corporate governance committee. Each non-chairperson member of the nominating and corporate governance committee will receive additional annual cash compensation in the amount of \$5,000 per year for such member's service on the nominating and corporate governance committee.
- The chairperson of the science and technology committee will receive additional annual cash compensation in the amount of \$10,000 per year for such chairperson's service on the science and technology committee. Each non-chairperson member of the science and technology committee will receive additional annual cash compensation in the amount of \$5,000 per year for such member's service on the science and technology committee.

Under the Director Compensation Program, each non-employee director will automatically be granted an option to purchase 45,000 shares of our common stock upon the director's initial appointment or election to our board of directors, referred to as the Initial Grant, and an option to purchase 22,500 shares of our common stock automatically on the date of each annual stockholders' meeting thereafter, referred to as the Annual Grant. The Initial Grant and the Annual Grant will vest as to 33.3% on the first anniversary of the date of grant and as to 1/36th on each monthly anniversary thereafter, subject to continued service through each applicable vesting date. The exercise price per share of director options is equal to the fair market value of a share of our common stock on the grant date, and the director options will vest in full upon the consummation of a Change in Control (as defined in the 2020 Plan).

The following table summarizes the total compensation earned during the year ended December 31, 2019 for our non-employee directors. We appointed John Milligan as a member of our

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board and its Executive Chairman, Susannah Gray, Nancy Miller-Rich and Shawn Cline Tomasello as members of our board, in August, July, November and November 2020, respectively, so they are not included in the table below.

<u>Name</u>	<u>Fees Earned or Paid in Cash (\$)</u>	<u>Option Awards (\$)(1)</u>	<u>All Other Compensation (\$)(2)</u>	<u>Total (\$)</u>
David Schaffer, Ph.D.	—	—	50,000	50,000
Charles Theuer, M.D., Ph.D.	35,000	159,295	—	194,295
Jacob Chacko, M.D.(3)	27,417	273,091	—	300,508
Tony Yao, M.D., Ph.D.	—	—	—	—
William Burkoth	—	—	—	—

- (1) Amounts shown represent the grant date fair value of options granted during fiscal year 2019 as calculated in accordance with ASC Topic 718. See Note 12 of the financial statements included in this prospectus for the assumptions used in calculating this amount. As of December 31, 2019, Dr. Theuer held options to purchase 45,517 shares of our common stock, Dr. Chacko held options to purchase 37,500 shares of our common stock and no other non-employee directors held any outstanding options or other equity awards.
- (2) Amount represents \$50,000 consulting payments paid to Dr. Schaffer in consideration for research services provided us in 2019.
- (3) Dr. Chacko was initially appointed as a member of the board in late March 2019, and his board director fees were pro-rated for his partial service in 2019.

EXECUTIVE COMPENSATION

The following is a discussion and analysis of compensation arrangements of our named executive officers (NEOs). This discussion contains forward looking statements that are based on our current plans, considerations, expectations and determinations regarding future compensation programs. Actual compensation programs that we adopt may differ materially from currently planned programs as summarized in this discussion. As an “emerging growth company” as defined in the JOBS Act, we are not required to include a Compensation Discussion and Analysis section and have elected to comply with the scaled disclosure requirements applicable to emerging growth companies.

We seek to ensure that the total compensation paid to our executive officers is reasonable and competitive. Compensation of our executives is structured around the achievement of individual performance and near-term corporate targets as well as long-term business objectives.

Our NEOs for fiscal year 2019 were as follows:

- David Kirn, M.D., our Chief Executive Officer;
- Peter Francis, M.D., Ph.D., our Chief Medical Officer; and
- August Moretti, our Chief Financial Officer.

Mr. Moretti started employment with us on January 7, 2019 and Dr. Francis was promoted to our Chief Medical Officer on January 15, 2019 when he was formerly our Senior Vice President, Clinical Translational R&D Program Leader, Retina Therapeutic Area.

2019 Summary Compensation Table

The following table sets forth information concerning the compensation of our NEOs for the years ended December 31, 2018 and 2019.

<u>Name and Principal Position</u>	<u>Year</u>	<u>Salary (\$)</u>	<u>Bonus (\$)</u>	<u>Option Awards (\$)(1)</u>	<u>Non-Equity Incentive Plan Compensation (\$)(2)</u>	<u>All Other Compensation (\$)(3)</u>	<u>Total (\$)</u>
David Kirn, M.D.	2019	430,000	—	—	111,800	12,500	554,300
<i>Chief Executive Officer</i>	2018	396,445	—	—	137,700	12,250	546,395
Peter Francis, M.D., Ph.D.	2019	322,917	—	1,069,139	77,419	84,537	1,554,012
<i>Chief Medical Officer</i>	2018	270,000	24,300	200,024	65,610	46,204	606,138
August Moretti	2019	374,242	—	1,661,243	89,725	12,500	2,137,710
<i>Chief Financial Officer(4)</i>							

- (1) Amounts shown represents the grant date fair value of options granted during fiscal year 2019 as calculated in accordance with ASC Topic 718. See Note 12 of the financial statements included in this registration statement for the assumptions used in calculating this amount.
- (2) Amounts represent the annual performance-based cash bonuses earned by our NEOs based on the achievement of certain corporate performance objectives during 2019. These amounts were paid to the NEOs in early 2020. Please see the descriptions of the annual performance bonuses paid to our named executive officers under “2019 Bonuses” below.
- (3) For 2019, amounts represent: (i) for Dr. Kirn, \$12,500 for matching contributions made by us under our 401(k) plan; (ii) for Dr. Francis, \$72,037 for reimbursements of travel expenses and \$12,500 for matching contributions made by us under our 401(k) plan; and (iii) for Mr. Moretti, \$12,500 for matching contributions made by us under our 401(k) plan.
- (4) Mr. Moretti commenced employment with us on January 7, 2019.

Outstanding Equity Awards at 2019 Fiscal Year End

The following table lists all outstanding equity awards held by our NEOs as of December 31, 2019. Dr. Kirn does not hold any outstanding equity awards as of December 31, 2019.

Name	Vesting Commencement Date(1)	Option Awards			
		Number of Securities Underlying Unexercised Options Exercisable (#)	Number Of Securities Underlying Unexercised Options Unexercisable (#)	Option Exercise Price (\$)	Option Expiration Date
Peter Francis, M.D., Ph.D.	9/30/2016(2)	59,070	15,930	3.19	4/19/2028
	1/15/2019(3)	33,614	113,066	9.41	3/19/2029
August Moretti.	1/7/2019	—	225,060	9.41	3/19/2029

- (1) Except as otherwise noted, options vest as to 25% of the shares on the one year anniversary of the vesting commencement date and vest as to 1/48th of the shares monthly thereafter, such that all awards will be vested on the four year anniversary of the vesting commencement date, subject to the holder continuing to provide services to us through such vesting date.
- (2) The options vested as to 11,280 of the shares on the one year anniversary of the vesting commencement date and vest as to 1,770 of the remaining shares monthly thereafter, subject to the holder continuing to provide services through such vesting date.
- (3) The option vests as to 1/48th of the shares on each monthly anniversary of the vesting commencement date, such that all awards will be vested on the four year anniversary of the vesting commencement date, subject to the holder continuing to provide services to us through such vesting date.

Narrative to Summary Compensation Table

2019 Salaries

Our NEOs each receive a base salary to compensate them for services rendered to our company. The base salary payable to each NEO is intended to provide a fixed component of compensation reflecting the executive's skill set, experience, role and responsibilities.

For fiscal year 2019, Dr. Kirn's annual base salary was \$430,000, Dr. Francis' base salary was increased to \$325,000 effective as of January 15, 2019 and Mr. Moretti's base salary was \$380,000 (pro-rated for his partial employment with us in 2019).

2019 Bonuses

We maintain an annual performance-based cash bonus program in which each of our NEOs participated in 2019. Each NEO's target bonus is expressed as a percentage of base salary which can be achieved by meeting company goals at target level. The 2019 annual bonuses for Drs. Kirn and Francis and Mr. Moretti were targeted at 40%, 35% and 35%, respectively, of their respective base salaries. Our board of directors has historically reviewed these target percentages to ensure they are adequate, but does not follow a formula. Instead, our board of directors set these rates based on each NEO's experience in their role with us and the level of responsibility held by the NEO, which we believe directly correlates to their ability to influence corporate results.

For determining performance bonus amounts, our board of directors set certain corporate performance goals after receiving input from our Chief Executive Officer. The performance goals generally relate to product development and other goals relating to our business.

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Following its review and determinations of corporate performance for 2019, our board of directors determined an achievement level of 65% for Dr. Kirn and 68.5% for Dr. Francis and Mr. Moretti. The actual amount of the cash bonuses awarded to each NEO for 2019 performance are set forth above in the Summary Compensation Table in the column titled "Non-Equity Incentive Plan Compensation."

Equity-Based Compensation

In March 2019, we granted to Dr. Francis an option to purchase 146,680 shares of our common stock in connection with his promotion to our Chief Medical Officer. The option vests and become exercisable as to 1/48th of the shares on each monthly anniversary of January 15, 2019, subject to his continued service through the applicable vesting date. In addition, in March 2019, we granted to Mr. Moretti an option to purchase 225,060 shares of our common stock in connection with his commencement of employment. The option vests and becomes exercisable as to 25% of the shares on the one year anniversary of January 7, 2019 and vest as to 1/48th of the shares monthly thereafter, subject to his continued service through the applicable vesting date. The exercise price per share for each option was \$9.41, which was the fair market value of our common stock as of the date of grant.

We intend to adopt the 2020 Plan, in order to facilitate the grant of cash and equity incentives to directors, employees (including our NEOs) and consultants of our company and certain of its affiliates and to enable us to obtain and retain services of these individuals, which is essential to our long-term success. We expect that the 2020 Plan will be effective on the date on which it is adopted by our board of directors, subject to approval of such plan by our stockholders. For additional information about the 2020 Plan, please see the section titled "Equity Compensation Plans" below.

Other Elements of Compensation

Retirement Savings and Health and Welfare Benefits

We currently maintain a 401(k) retirement savings plan for our employees, including our NEOs, who satisfy certain eligibility requirements. Our NEOs are eligible to participate in the 401(k) plan on the same terms as other full-time employees. We make matching contributions equal to 50% of employee contributions of the first ten percent of compensation. Matching contributions will vest annually over 4 years. We believe that providing a vehicle for tax-deferred retirement savings through our 401(k) plan adds to the overall desirability of our executive compensation package and further incentivizes our employees, including our NEOs, in accordance with our compensation policies.

All of our full-time employees, including our NEOs, are eligible to participate in our health and welfare plans, including medical, dental and vision benefits; medical and dependent care flexible spending accounts; short-term and long-term disability insurance; and life and AD&D insurance.

Perquisites and Other Personal Benefits

We provide limited perquisites to our NEOs, such as the reimbursement of Dr. Francis' travel reimbursements, when our compensation committee determines that such perquisites are necessary or advisable to fairly compensate or incentivize our employees. We reimbursed Dr. Francis in the amount of \$72,037 in 2019 for travel-related expenses incurred in connection with his travel between his home office in Oregon and our headquarters in California.

Executive Compensation Arrangements

Employment Agreements

As of December 31, 2019, we were party to offer letters with each of our NEOs, which set forth their initial base salary, annual bonus opportunity, initial stock option grant, benefit plans participation and the other benefits noted below for each NEO.

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David Kirn, M.D. In addition to the above, Dr. Kirn is eligible to receive certain severance benefits upon qualifying terminations under the offer letter. In the event we terminate Dr. Kirn other than for cause or Dr. Kirn resigns for good reason, then (i) he will receive a lump sum payment equal to 12 months of his base salary, (ii) a lump sum cash payment equal to his prorated annual target bonus for the year in which the termination occurs and (iii) reimbursement of COBRA premiums for up to 12 months. The severance benefits set forth above are subject to his timely execution and non-revocation of a general release of claims against us. In addition, effective as of late 2018, the board approved that Dr. Kirn is also eligible for 100% accelerated vesting of any of his outstanding equity awards upon a change in control, subject to his continued employment through such date.

Peter Francis, M.D., Ph.D. In addition to the above, effective as of Dr. Francis' promotion in early 2019, Dr. Francis is eligible to receive certain severance benefits upon qualifying terminations under the offer letter. In the event we terminate Dr. Francis other than for cause or Dr. Francis resigns for good reason, then (i) he will receive a lump sum payment equal to 9 months of his base salary and (ii) reimbursement of COBRA premiums for up to 9 months. In addition to the severance benefits above, in the event we undergo a change in control, he will receive accelerated vesting of 100% of the then-unvested equity awards held by him. The severance benefits set forth above are subject to his timely execution and non-revocation of a general release of claims against us.

August Moretti. In addition to the above, Mr. Moretti is eligible to receive certain severance benefits upon qualifying terminations under the offer letter. In the event we terminate Mr. Moretti other than for cause or Mr. Moretti resigns for good reason, in any case, outside of 1 month prior to, or 12 months following a change in control (as defined in the 2015 Plan), then he will receive (i) a lump sum payment equal to 9 months of his base salary and (ii) reimbursement of COBRA premiums for up to 9 months. In the event we terminate Mr. Moretti other than for cause or Mr. Moretti resigns for good reason, in any case, within the 1 month prior to or the 12 months following a change in control, then, in addition to the benefits in (i) and (ii) above, he will receive accelerated vesting of 100% of the then-unvested equity awards held by him. The severance benefits set forth above are subject to his timely execution and non-revocation of a general release of claims against us and continued compliance with the Confidential Information and Invention Assignment Agreement.

For the purposes of Drs. Kirn's and Francis' offer letters, "cause" is defined as (i) their material failure to perform their principally assigned duties or responsibilities as an employee, director or consultant (other than a failure resulting from disability (as defined under Section 22(e)(3) of the Code); provided that, the failure to achieve certain results, such as the our business plan, in and of itself, would not constitute "cause"; (ii) their engaging in any act of dishonesty, fraud or material misrepresentation; (iii) their violation of any federal or state law or regulation applicable to our business that results in or could reasonably be expected to result in harm or creates material risk, as determined by the board of directors; (iv) their breach of any confidentiality agreement or invention assignment agreement, or any other material contract made between us and them or violation of any of our written policies; or (v) their being convicted of, or entering a plea of nolo contendere to, any crime or committing any act of moral turpitude. In the case of (i) above, we shall not terminate Drs. Kirn or Francis without first providing them with written notice of the acts or omissions constituting the grounds for such termination and expiration of a reasonable cure period not to exceed thirty 30 days following the date of such notice if we reasonably judge that such failure may be cured within 30 days.

For the purposes of Mr. Moretti's offer letter, "cause" is defined as (i) his material failure to perform his principally assigned duties or responsibilities as an employee, director or consultant (other than a failure resulting from disability (as defined under Section 22(e)(3) of the Code); provided that, the failure to achieve certain results, such as our business plan, in and of itself, would not constitute "cause"; (ii) his engaging in any act of dishonesty, fraud or material misrepresentation; (iii) his violation of any federal or state law or regulation applicable to our business that results in or could reasonably

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be expected to result in harm, or creates material risk, as determined by the board of directors; (iv) his breach of any confidentiality agreement or invention assignment agreement, or any other material contract between him and us or his violation of any of our written policies (or any of our affiliates); (v) his being convicted of, or entering a plea of nolo contendere to, any crime or committing any act of moral turpitude; or (vi) his commission of any act or involvement in any situation, or occurrence, which brings him into widespread public disrepute, contempt, scandal or ridicule, or which justifiably shocks, insults or offends a significant portion of the community, or his being subject to publicity for any such conduct or involvement in such conduct. In the case of (i) above, we shall not terminate Mr. Moretti without first providing him with written notice of the acts or omissions constituting the grounds for such termination and expiration of a reasonable cure period not to exceed thirty 30 days following the date of such notice if we reasonably judge that such failure may be cured within 30 days.

For the purposes of Mr. Moretti's offer letter, "good reason" is defined as (i) a material diminution in his salary except for across-the-board salary reductions similarly affecting all or substantially all similarly situated employees, (ii) a material diminution in his authority, duties or responsibilities or (iii) a change of more than 50 miles in the geographic location at which he provides services, provided, however, that in the event of the occurrence of a good reason condition listed above, he must provide notice to us within 30 days of the initial occurrence of such condition and allow us 30 days in which to cure such condition. Additionally, in the event we fail to cure the condition within the cure period provided, he must terminate employment with us within sixty (60) days of the end of the cure period.

For the purposes of Dr. Francis' offer letter, "good reason" is defined as the occurrence, without his written consent, of (i) a material diminution in his salary except for across-the-board salary reductions similarly affecting all or substantially all similarly situated employees, (ii) any material and adverse change, including any material diminution in his title, duties, authority or responsibilities, but excluding any such changes in the event of a change of control; provided his remaining duties and responsibilities are consistent with industry norms for the title, (iii) a change of more than 50 miles in the geographic location of our offices, (iv) assignment of duties materially inconsistent with his position, or (v) any material breach by us of the offer letter; provided, however, that in the event of the occurrence of a good reason condition listed above, he must provide written notice to us within 20 days of the initial occurrence of such condition and allow us 30 days in which to cure such condition. His termination will be effective once the 30 day period has lapsed and we have failed to materially cure such acts, failures or failures to act that gave rise to the good reason. We may, in our sole election, waive any cure period such that his termination will be effective on such earlier date determined by our board of directors.

For the purposes of Dr. Kirn's offer letter, "good reason" is defined as (i) a change of more than 50 miles in the geographic location of our offices; (ii) his removal from the our board of directors or (iii) any material and adverse change, including any material diminution in his title, duties, authority or responsibilities, but excluding any such changes or changes in reporting relationships in the event of a Change of Control; provided his remaining duties and responsibilities are consistent with industry norms for the title.

For the purposes of Dr. Kirn's offer letter, a "change in control" occurs when any "person" (as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended) is or becomes the "beneficial owner" (as defined in Rule 13d-3 under the Securities Exchange Act of 1934), directly or indirectly, of our securities representing more than 50% of the total voting power or (ii) on the date of the consummation of a merger or consolidation with any other corporation that has been approved by our stockholders, other than a merger or consolidation which would result in our voting securities outstanding immediately prior to the merger or consolidation continuing to represent at least 50% of the total voting power represented by our voting securities or the voting securities such surviving entity or its parent outstanding immediately after such merger or consolidation; or (iii) the date

of the consummation of the sale or disposition by us of all or substantially all the our assets. A transaction will not be deemed a change in control under Dr. Kirn's offer letter unless the transaction qualifies as a "change in control event" within the meaning of Section 409A of the Code.

Equity Compensation Plans

The following summarizes the material terms of the long-term incentive compensation plan in which our NEOs will be eligible to participate following the consummation of this offering and our 2015 Equity Incentive Plan, referred to as the 2015 Plan, under which we have previously made periodic grants of equity and equity-based awards to our NEOs and other key employees. We intend to file with the SEC a registration statement on Form S-8 covering the shares of our common stock issuable under the 2020 Plan, the 2015 Plan and the ESPP.

2020 Incentive Award Plan

We intend to adopt the 2020 Plan, which we expect will become effective upon the day prior to the effectiveness of the registration statement to which this prospectus relates, subject to approval of such plan by our stockholders. The principal purpose of the 2020 Plan is to attract, retain and motivate selected employees, consultants and directors through the granting of stock-based compensation awards and cash-based performance bonus awards. The material terms of the 2020 Plan, as it is currently contemplated, are summarized below.

Share reserve. Under the 2020 Plan, 2,315,498 shares of our common stock will be initially reserved for issuance pursuant to a variety of stock-based compensation awards, including stock options, stock appreciation rights (SARs) restricted stock awards, restricted stock unit awards and other stock-based awards. The number of shares initially reserved for issuance or transfer pursuant to awards under the 2020 Plan will be increased by an annual increase on the first day of each fiscal year beginning in 2021 and ending in 2030, equal to the lesser of (i) five percent of the shares of stock outstanding (on an as converted basis) on the last day of the immediately preceding fiscal year and (ii) such smaller number of shares of stock as determined by our board of directors; provided, however, that no more than 18,000,000 shares of stock may be issued upon the exercise of incentive stock options.

The following counting provisions will be in effect for the share reserve under the 2020 Plan:

- to the extent that an award terminates, expires or lapses for any reason or an award is settled in cash without the delivery of shares, any shares subject to the award at such time will be available for future grants under the 2020 Plan;
- to the extent shares are tendered or withheld to satisfy the grant, exercise price or tax withholding obligation with respect to any award under the 2020 Plan, such tendered or withheld shares will be available for future grants under the 2020 Plan;
- to the extent shares subject to SARs are not issued in connection with the stock settlement of SARs on exercise thereof, such shares will be available for future grants under the 2020 Plan;
- to the extent that shares of our common stock are repurchased by us prior to vesting so that shares are returned to us, such shares will be available for future grants under the 2020 Plan;
- the payment of dividend equivalents in cash in conjunction with any outstanding awards will not be counted against the shares available for issuance under the 2020 Plan; and
- to the extent permitted by applicable law or any exchange rule, shares issued in assumption of, or in substitution for, any outstanding awards of any entity acquired in any form of combination by us or any of our subsidiaries will not be counted against the shares available for issuance under the 2020 Plan.

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Administration. The compensation committee of our board of directors is expected to administer the 2020 Plan unless our board of directors assumes authority for administration. The compensation committee must consist of at least three members of our board of directors, each of whom is intended to qualify as a “non-employee director” for purposes of Rule 16b-3 under the Exchange Act and an “independent director” within the meaning of the rules of the applicable stock exchange, or other principal securities market on which shares of our common stock are traded. The 2020 Plan provides that the board or compensation committee may delegate its authority to grant awards to employees other than executive officers and certain senior executives to a committee consisting of one or more members of our board of directors or one or more of our officers, other than awards made to our non-employee directors, which must be approved by our full board of directors.

Subject to the terms and conditions of the 2020 Plan, the administrator has the authority to select the persons to whom awards are to be made, to determine the number of shares to be subject to awards and the terms and conditions of awards, and to make all other determinations and to take all other actions necessary or advisable for the administration of the 2020 Plan. The administrator is also authorized to adopt, amend or rescind rules relating to administration of the 2020 Plan. Our board of directors may at any time remove the compensation committee as the administrator and revert in itself the authority to administer the 2020 Plan. The full board of directors will administer the 2020 Plan with respect to awards to non-employee directors.

Eligibility. Options, SARs, restricted stock and all other stock-based and cash-based awards under the 2020 Plan may be granted to individuals who are then our officers, employees or consultants or are the officers, employees or consultants of certain of our subsidiaries. Such awards also may be granted to our directors. Only employees of our company or certain of our subsidiaries may be granted incentive stock options (ISOs).

Awards. The 2020 Plan provides that the administrator may grant or issue stock options, SARs, restricted stock, restricted stock units, other stock- or cash-based awards and dividend equivalents or any combination thereof. Each award will be set forth in a separate agreement with the person receiving the award and will indicate the type, terms and conditions of the award.

- *Nonstatutory stock options.* Nonstatutory Stock Options (NSOs) will provide for the right to purchase shares of our common stock at a specified price which may not be less than fair market value on the date of grant, and usually will become exercisable (at the discretion of the administrator) in one or more installments after the grant date, subject to the participant’s continued employment or service with us and/or subject to the satisfaction of corporate performance targets and individual performance targets established by the administrator. NSOs may be granted for any term specified by the administrator that does not exceed ten years.
- *Incentive stock options.* ISOs will be designed in a manner intended to comply with the provisions of Section 422 of the Code and will be subject to specified restrictions contained in the Code. Among such restrictions, ISOs must have an exercise price of not less than the fair market value of a share of common stock on the date of grant, may only be granted to employees and must not be exercisable after a period of ten years measured from the date of grant. In the case of an ISO granted to an individual who owns (or is deemed to own) at least 10% of the total combined voting power of all classes of our capital stock, the 2020 Plan provides that the exercise price must be at least 110% of the fair market value of a share of common stock on the date of grant and the ISO must not be exercisable after a period of five years measured from the date of grant.
- *Restricted stock.* Restricted stock may be granted to any eligible individual and made subject to such restrictions as may be determined by the administrator. Restricted stock, typically, may be forfeited for no consideration or repurchased by us at the original purchase price if the

conditions or restrictions on vesting are not met. In general, restricted stock may not be sold or otherwise transferred until restrictions are removed or expire. Purchasers of restricted stock, unlike recipients of options, will have voting rights and will have the right to receive dividends, if any, prior to the time when the restrictions lapse, however, extraordinary dividends will generally be placed in escrow, and will not be released until restrictions are removed or expire.

- *Restricted stock units.* Restricted stock units may be awarded to any eligible individual, typically without payment of consideration, but subject to vesting conditions based on continued employment or service or on performance criteria established by the administrator. Like restricted stock, restricted stock units may not be sold, or otherwise transferred or hypothecated, until vesting conditions are removed or expire. Unlike restricted stock, stock underlying restricted stock units will not be issued until the restricted stock units have vested, and recipients of restricted stock units generally will have no voting or dividend rights prior to the time when vesting conditions are satisfied.
- *Stock appreciation rights.* SARs may be granted in connection with stock options or other awards, or separately. SARs granted in connection with stock options or other awards typically will provide for payments to the holder based upon increases in the price of our common stock over a set exercise price. The exercise price of any SAR granted under the 2020 Plan must be at least 100% of the fair market value of a share of our common stock on the date of grant. SARs under the 2020 Plan will be settled in cash or shares of our common stock, or in a combination of both, at the election of the administrator.
- *Other stock or cash based awards.* Other stock or cash based awards are awards of cash, fully vested shares of our common stock and other awards valued wholly or partially by referring to, or otherwise based on, shares of our common stock. Other stock or cash based awards may be granted to participants and may also be available as a payment form in the settlement of other awards, as standalone payments and as payment in lieu of base salary, bonus, fees or other cash compensation otherwise payable to any individual who is eligible to receive awards. The plan administrator will determine the terms and conditions of other stock or cash based awards, which may include vesting conditions based on continued service, performance and/or other conditions.
- *Dividend equivalents.* Dividend equivalents represent the right to receive the equivalent value of dividends paid on shares of our common stock and may be granted alone or in tandem with awards other than stock options or SARs. Dividend equivalents are credited as of dividend payments dates during the period between a specified date and the date such award terminates or expires, as determined by the plan administrator. In addition, dividend equivalents with respect to shares covered by a performance award will only be paid to the participant at the same time or times and to the same extent that the vesting conditions, if any, are subsequently satisfied and the performance award vests with respect to such shares.

Any award may be granted as a performance award, meaning that the award will be subject to vesting and/or payment based on the attainment of specified performance goals.

Change in control. In the event of a change in control, unless the plan administrator elects to terminate an award in exchange for cash, rights or other property, or cause an award to accelerate in full prior to the change in control, such award will continue in effect or be assumed or substituted by the acquirer, provided that any performance-based portion of the award will be subject to the terms and conditions of the applicable award agreement. In the event the acquirer refuses to assume or replace awards granted, prior to the consummation of such transaction, awards issued under the 2020 Plan will be subject to accelerated vesting such that 100% of such awards will become vested and exercisable or payable, as applicable. The administrator may also make appropriate adjustments to awards under the 2020 Plan and is authorized to provide for the acceleration, cash-out, termination, assumption,

substitution or conversion of such awards in the event of a change in control or certain other unusual or nonrecurring events or transactions.

Adjustments of awards. In the event of any stock dividend or other distribution, stock split, reverse stock split, reorganization, combination or exchange of shares, merger, consolidation, split-up, spin-off, recapitalization, repurchase or any other corporate event affecting the number of outstanding shares of our common stock or the share price of our common stock that would require adjustments to the 2020 Plan or any awards under the 2020 Plan in order to prevent the dilution or enlargement of the potential benefits intended to be made available thereunder, the administrator will make appropriate, proportionate adjustments to: (i) the aggregate number and type of shares subject to the 2020 Plan; (ii) the number and kind of shares subject to outstanding awards and terms and conditions of outstanding awards (including, without limitation, any applicable performance targets or criteria with respect to such awards); and (iii) the grant or exercise price per share of any outstanding awards under the 2020 Plan.

Amendment and termination. The administrator may terminate, amend or modify the 2020 Plan at any time and from time to time. However, we must generally obtain stockholder approval to the extent required by applicable law, rule or regulation (including any applicable stock exchange rule). Notwithstanding the foregoing, an option may be amended to reduce the per share exercise price below the per share exercise price of such option on the grant date and options may be granted in exchange for, or in connection with, the cancellation or surrender of options having a higher per share exercise price without receiving additional stockholder approval.

No incentive stock options may be granted pursuant to the 2020 Plan after the tenth anniversary of the effective date of the 2020 Plan, and no additional annual share increases to the 2020 Plan's aggregate share limit will occur from and after such anniversary. Any award that is outstanding on the termination date of the 2020 Plan will remain in force according to the terms of the 2020 Plan and the applicable award agreement.

2015 Equity Incentive Plan

On March 20, 2015, our board of directors adopted, and our stockholders approved, the 2015 Plan. Following the offering, and in connection with the effectiveness of our 2020 Plan, the 2015 Plan will terminate, and no further awards will be granted under the 2015 Plan. However, all outstanding awards will continue to be governed by their existing terms.

Administration. Our board of directors, or a committee thereof appointed by our board of directors, has the authority to administer the 2015 Plan and the awards granted under it. The plan administrator has broad authority to make determinations and interpretations under, prescribe forms for use with and adopt rules for the administration of, the 2015 Plan, subject to its express terms and conditions. The plan administrator also sets the terms and conditions of all awards under the 2015 Plan, including any vesting and acceleration conditions.

Limitation on awards and shares available. The aggregate number of shares of our common stock that is authorized pursuant to the 2015 Plan is 4,189,028, which shares may be authorized but unissued shares, reacquired common stock or represent shares underlying forfeited awards. Shares tendered or withheld to satisfy grant or exercise price or tax withholding obligations associated with an award granted under the 2015 Plan and shares issued pursuant to awards of restricted stock or restricted stock units that are repurchased by us or are forfeited due to the failure to vest may be used again for new grants under the 2015 Plan.

Awards. The 2015 Plan provides that the administrator may grant or issue ISOs, NSOs, SARs, restricted stock and restricted stock units to our employees, directors and consultants, provided that

only employees may be granted ISOs. Awards under the 2015 Plan are set forth in award agreements, which detail the terms and conditions of the awards, including any applicable vesting and payment terms and post-termination exercise limitations. Awards are generally settled in shares of our common stock.

- *Stock Options.* Stock options provide for the purchase of shares of our common stock in the future at an exercise price set on the grant date. ISOs, by contrast to NSOs, may provide tax deferral beyond exercise and favorable capital gains tax treatment to their holders if certain holding period and other Internal Revenue Code requirements are satisfied. The exercise price of a stock option may not be less than 100% of the fair market value of the underlying share on the date of grant (or 110% in the case of ISOs granted to certain significant stockholders), except with respect to certain substitute options granted in connection with a corporate transaction. The term of a stock option may not be longer than ten years (or five years in the case of ISOs granted to certain significant stockholders). Vesting conditions determined by the plan administrator may apply to stock options and may include continued service, performance and/or other conditions. A stock option may provide for “early exercise” prior to vesting in exchange for shares of restricted shares that vest on the option’s vesting schedule.
- *Stock appreciation rights.* SARs may be granted in connection with stock options or other awards, or separately. SARs granted in connection with stock options or other awards typically will provide for payments to the holder based upon increases in the price of our common stock over a set exercise price. The exercise price of any SAR granted under the 2015 Plan must be at least 100% of the fair market value of a share of our common stock on the date of grant. SARs under the 2015 Plan will be settled in cash or shares of our common stock, or in a combination of both, as set forth in the applicable award agreement.
- *Restricted stock.* Restricted stock may be granted to any eligible individual and made subject to such restrictions as may be determined by the administrator. Restricted stock, typically, may be forfeited for no consideration or repurchased by us at the original purchase price if the conditions or restrictions on vesting are not met. In general, restricted stock may not be sold or otherwise transferred until restrictions are removed or expire. Purchasers of restricted stock, unlike recipients of options, will have voting rights and will have the right to receive dividends, if any, prior to the time when the restrictions lapse.
- *Restricted stock units.* Restricted stock units may be awarded to any eligible individual, typically without payment of consideration, but subject to vesting conditions continuing service with us or our affiliates, the attainment of performance goals and/or such other conditions as the plan administrator may determine. Like restricted stock, restricted stock units may not be sold, or otherwise transferred or hypothecated, until vesting conditions are removed or expire. Unlike restricted stock, stock underlying restricted stock units will not be issued until the restricted stock units have vested, and recipients of restricted stock units generally will have no voting or dividend rights prior to the time when vesting conditions are satisfied.

Certain transactions. The plan administrator has broad discretion to equitably adjust the provisions of the 2015 Plan, as well as the terms and conditions of existing and future awards, to prevent the diminution or enlargement of intended benefits and facilitate necessary or desirable changes in the event of certain transactions and events affecting our common stock, such as a dividend or other distribution (whether in the form of cash, Shares, other securities or other property), recapitalization, reincorporation, stock split, reverse stock split, reorganization, merger, consolidation, split-up, spin-off, combination, reclassification, repurchase or exchange of our shares or our other securities, or other change in our corporate structure. In the event of a merger with or into another corporation or other entity or a change in control (as defined in the 2015 Plan), the plan administrator may provide, in any combination hereof, subject to the applicable award agreement and without the participant’s consent, that (i) the surviving entity assume outstanding awards or substitute economically

equivalent awards for such outstanding awards; (ii) that the participant's awards will terminate upon or immediately prior to the consummation of the merger or change in control; (iii) outstanding awards will vest and become exercisable, realizable or payable, or restrictions applicable to an award will lapse, in whole or in part prior to or upon consummation of such merger or change in control; and (iv) the termination of an award in exchange for any combination of cash, property or other rights, if any, selected by the administrator in its sole discretion, equal in value to the cash or other property that would have been attained upon the exercise of such award or realization of the participant's rights as of the date of the occurrence of the transaction. The administrator may also make appropriate adjustments to awards under the 2015 Plan and is authorized to provide for the acceleration, cash-out, termination, assumption, substitution or conversion of such awards in the event of a change in control or certain other unusual or nonrecurring events or transactions.

Foreign participants, transferability and participant payments. The plan administrator may establish sub-plans under the 2015 Plan, subject to the share limits described above, containing such limitations and other terms and conditions that the plan administrator determines is necessary or desirable to satisfy blue sky, securities, tax or other laws of various jurisdictions in which we intend to grant awards or qualifying for favorable tax treatment under applicable foreign laws. With limited exceptions for gifts or executors of the participant's estate upon the participant's death, in connection with certain acquisitions or a change in control, and transfers to us, awards under the 2015 Plan are generally non-transferable prior to exercise or delivery and are exercisable only by the participant. With regard to tax withholding, exercise price and purchase price obligations arising in connection with awards under the 2015 Plan, as applicable, the plan administrator may, in its discretion, accept cash, check, promissory note, shares of our common stock that meet specified conditions, such other consideration and method of payment for the issuance of shares, to the extent permitted by applicable laws, by "net exercise," a "market sell order" or any combination thereof.

Amendment; termination. Our board of directors may amend or terminate the 2015 Plan at any time; however, (i) no amendment or termination may adversely affect an outstanding award without the affected participant's written consent and (ii) except in connection with certain changes in our capital structure, stockholder approval will be required for (A) any amendment that increases the number of shares available under the 2015 Plan or extends the term of the 2015 Plan, or (B) as required under applicable law. No award may be granted pursuant to the 2015 Plan after the ten year anniversary of the date the 2015 Plan, as amended or restated, was approved by our board of directors or our stockholders (whichever was earlier), however, we will cease granting awards under the 2015 Plan upon effectiveness of the 2020 Plan.

We intend to file with the SEC a registration statement on Form S-8 covering our shares of common stock issuable under the 2015 Plan.

2020 Employee Stock Purchase Plan

We intend to adopt and ask our stockholders to approve the ESPP, which will be effective upon the day prior to the effectiveness of the registration statement to which this prospectus relates. The ESPP is designed to allow our eligible employees to purchase shares of our common stock, at semi-annual intervals, with their accumulated payroll deductions. The ESPP is intended to qualify under Section 423 of the Code. The material terms of the ESPP, as it is currently contemplated, are summarized below.

Administration. Subject to the terms and conditions of the ESPP, our compensation committee will administer the ESPP. Our compensation committee can delegate administrative tasks under the ESPP to the services of an agent and/or employees to assist in the administration of the ESPP. The administrator will have the discretionary authority to administer and interpret the ESPP. Interpretations

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and constructions of the administrator of any provision of the ESPP or of any rights thereunder will be conclusive and binding on all persons. We will bear all expenses and liabilities incurred by the ESPP administrator.

Share reserve. The maximum number of shares of our common stock which will be authorized for sale under the ESPP is equal to the sum of (i) 215,956 shares of common stock and (ii) an annual increase on the first day of each year beginning in 2021 and ending in 2030, equal to the lesser of (A) one percent of the shares of common stock outstanding (on an as converted basis) on the last day of the immediately preceding fiscal year and (B) such number of shares of common stock as determined by our board of directors; provided, however, no more than 15,000,000 shares of our common stock may be issued under the ESPP. The shares reserved for issuance under the ESPP may be authorized but unissued shares or reacquired shares.

Eligibility. Employees eligible to participate in the ESPP for a given offering period generally include employees who are employed by us or one of our subsidiaries on the first day of the offering period, or the enrollment date. Our employees (and, if applicable, any employees of our subsidiaries) who customarily work less than five months in a calendar year or are customarily scheduled to work less than 20 hours per week will not be eligible to participate in the ESPP. Finally, an employee who owns (or is deemed to own through attribution) 5% or more of the combined voting power or value of all our classes of stock or of one of our subsidiaries will not be allowed to participate in the ESPP.

Participation. Employees will enroll under the ESPP by completing a payroll deduction form permitting the deduction from their compensation of at least 1% of their compensation but not more than 15% of their compensation. Such payroll deductions may be expressed as either a whole number percentage or a fixed dollar amount, and the accumulated deductions will be applied to the purchase of shares on each purchase date. However, a participant may not purchase more than 60,000 shares in each offering period and may not subscribe for more than \$25,000 in fair market value of shares of our common stock (determined at the time the option is granted) during any calendar year. The ESPP administrator has the authority to change these limitations for any subsequent offering period.

Offerings. Generally, the ESPP will offer employees the option to purchase shares through a series of overlapping 24-month offering periods, and each offering period will generally be comprised of four 6-month purchase periods. The initial offering period under the ESPP will be longer than 24 months, commencing February 15, 2021 and ending on May 14, 2023. The initial purchase period under the ESPP will commence on February 15, 2021 and end on November 14, 2021, with the remaining purchase periods in the initial offering period to be comprised of consecutive six month periods. In no event may an offering period be longer than 27 months in length.

The option purchase price will be the lower of 85% of the closing trading price per share of our common stock on the trading date immediately preceding the first day of an offering period in which a participant is enrolled or 85% of the closing trading price per share on the trading day immediately preceding the last day of each purchase period.

Unless a participant has previously canceled his or her participation in the ESPP before the purchase date, the participant will be deemed to have exercised his or her option in full as of each purchase date. Upon exercise, the participant will purchase the number of whole shares that his or her accumulated payroll deductions will buy at the option purchase price, subject to the participation limitations listed above.

A participant may cancel his or her payroll deduction authorization at any time prior to the end of the offering period. Upon cancellation, the participant will have the option to either (i) receive a refund of the participant's account balance in cash without interest or (ii) exercise the participant's option for

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the current offering period for the maximum number of shares of common stock on the applicable purchase date, with the remaining account balance refunded in cash without interest. Following at least one payroll deduction, a participant may also decrease (but not increase) his or her payroll deduction authorization once during any offering period. If a participant wants to increase or decrease the rate of payroll withholding, he or she may do so effective for the next offering period by submitting a new form before the offering period for which such change is to be effective.

A participant may not assign, transfer, pledge or otherwise dispose of (other than by will or the laws of descent and distribution) payroll deductions credited to a participant's account or any rights to exercise an option or to receive shares of our common stock under the ESPP, and during a participant's lifetime, options in the ESPP shall be exercisable only by such participant. Any such attempt at assignment, transfer, pledge or other disposition will not be given effect.

Adjustments upon changes in recapitalization, dissolution, liquidation, merger or asset sale. In the event of any increase or decrease in the number of issued shares of our common stock resulting from a stock split, reverse stock split, stock dividend, combination or reclassification of the common stock, or any other increase or decrease in the number of shares of common stock effected without receipt of consideration by us, we will proportionately adjust the aggregate number of shares of our common stock offered under the ESPP, the number and price of shares which any participant has elected to purchase under the ESPP and the maximum number of shares which a participant may elect to purchase in any single offering period. If there is a proposal to dissolve or liquidate us, then the ESPP will terminate immediately prior to the consummation of such proposed dissolution or liquidation, and any offering period and purchase period then in progress will be shortened by setting a new purchase date to take place before the date of our dissolution or liquidation. We will notify each participant of such change in writing at least ten business days prior to the new exercise date. If we undergo a merger with or into another corporation or sell all or substantially all of our assets, each outstanding option will be assumed or an equivalent option substituted by the successor corporation or the parent or subsidiary of the successor corporation. If the successor corporation refuses to assume the outstanding options or substitute equivalent options, then any offering period and purchase period then in progress will be shortened by setting a new purchase date to take place before the date of our proposed sale or merger. We will notify each participant of such change in writing at least ten business days prior to the new exercise date.

Amendment and termination. Our board of directors may amend, suspend or terminate the ESPP at any time. However, the board of directors may not amend the ESPP without obtaining stockholder approval within 12 months before or after such amendment to the extent required by applicable laws.

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

The following is a description of transactions since January 1, 2017 to which we have been a party, in which the amount involved exceeds \$120,000, and in which any of our directors, executive officers or beneficial owners of more than 5% of our capital stock, or an affiliate or immediate family member thereof, had or will have a direct or indirect material interest.

Sales and Purchases of Securities**Series B Convertible Preferred Stock Financing**

In August 2018, we issued an aggregate of 5,154,632 shares of our Series B convertible preferred stock at \$17.46 per share for aggregate proceeds to us of \$90.0 million.

The table below sets forth the aggregate number of shares of Series B convertible preferred stock sold to our directors, executive officers or owners of more than 5% of a class of our capital stock, or an affiliate or immediate family member thereof:

<u>Name</u>	<u>Number of Shares of Series B Convertible Preferred Stock</u>	<u>Aggregate Purchase Price (\$)</u>
Pfizer Inc.(1)	343,642	5,999,989.32

(1) William Burkoth, a member of our board of directors, is an employee of Pfizer Inc.

Series C Convertible Preferred Stock Financing

From April to June 2020, we issued in a series of transactions an aggregate of 4,200,353 shares of our Series C convertible preferred stock at \$18.00 per share for aggregate proceeds to us of \$75.6 million.

The table below sets forth the aggregate number of shares of Series C convertible preferred stock sold to our directors, executive officers or owners of more than 5% of a class of our capital stock, or an affiliate or immediate family member thereof:

<u>Name</u>	<u>Number of Shares of Series C Convertible Preferred Stock</u>	<u>Aggregate Purchase Price (\$)</u>
Viking Global Opportunities Illiquid Investments Sub-Master LP	833,333	14,999,994.00
ArrowMark Life Science Fund, LP(1)	27,777	499,986.00
Iron Horse Investments, LLC(1)	152,777	2,749,986.00
Pfizer Ventures (US) LLC(2)	166,666	2,999,988.00

(1) Tony Yao, a member of our board of directors, is employed as a portfolio manager for ArrowMark Colorado Holdings LLC (ArrowMark Colorado). ArrowMark Colorado is investment advisor to ArrowMark Life Science Fund, LP and Iron Horse Investments, LLC.

(2) William Burkoth, a member of our board of directors, is an employee of Pfizer Inc., which is the parent of Pfizer Ventures (US) LLC.

Director and Executive Officer Compensation

Please see the sections titled "Director Compensation" and "Executive Compensation" for information regarding the compensation of our directors and executive officers.

Employment Agreements

We have entered into employment agreements with our executive officers. For more information regarding these agreements, see the section titled “Executive Compensation—Narrative to Summary Compensation Table and Outstanding Equity Awards at 2019 Fiscal Year End.”

Indemnification Agreements and Directors’ and Officers’ Liability Insurance

We have entered into or intend to enter into indemnification agreements with each of our directors and executive officers. These agreements will require us to, among other things, indemnify each director and executive officer to the fullest extent permitted by Delaware law, including indemnification of expenses such as attorneys’ fees, judgments, penalties fines and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action or proceeding by or in right of us, arising out of the person’s services as a director or executive officer. We have obtained an insurance policy that insures our directors and officers against certain liabilities, including liabilities arising under applicable securities laws. For additional information see the section titled “Management—Limitation of Liability and Indemnification Matters.”

Investors’ Rights Agreement

We entered into an amended and restated investors’ rights agreement with the purchasers of our outstanding redeemable convertible preferred stock, including entities with which certain of our directors are affiliated. As of September 30, 2020, the holders of 11.6 million shares of our common stock, including the shares of our common stock issuable upon the automatic conversion of our Series A, Series A-1, Series B and Series C redeemable convertible preferred stock, are entitled to rights with respect to the registration of their shares under the Securities Act. For a more detailed description of these registration rights, see the section titled “Description of Capital Stock—Registration Rights.” The investors’ rights agreement also provides for a right of first refusal in favor of certain holders of redeemable convertible preferred stock with regard to certain issuances of our capital stock. The rights of first refusal will not apply to, and will terminate upon the consummation of, this offering. The investors’ right agreement also provides for certain voting arrangements. For a description of these voting arrangements, see the section titled “Management—Board Composition—Voting Arrangements.”

Right of First Refusal and Co-Sale Agreement

We entered into an amended and restated right of first refusal and co-sale agreement with certain holders of our common stock and redeemable convertible preferred stock. This agreement provides for rights of first refusal and co-sale relating to the shares of our common stock held by the parties to the agreement. Upon the consummation of this offering, the amended and restated right of first refusal and co-sale agreement will terminate.

Other Transactions

In April 2019, we entered into the SRAs with the U.C. Berkeley to conduct research in a lab on the Berkeley campus that is under the direction of Dr. Schaffer. Pursuant to the SRAs, we have committed to pay the U.C. Berkeley a total of \$1.5 million, of which \$0.4 million was paid upon execution of the SRAs. The SRAs have a three year term ending in 2022. While the SRAs are between us and the UC Regents, the payments under the SRAs may be used to fund the lab under the direction of Dr. Schaffer.

Our former Chief Operating Officer, Anthony Davies, who was employed through November 2017, was the Executive Chairman of Dark Horse Consulting. During the year ended December 31,

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2017, we paid \$0.2 million to Dark Horse Consulting under a consulting agreement to design and implement pharmaceutical quality manufacturing of and controls for drug products. The consulting agreement terminated in December 2017.

Other than as described above, since January 1, 2017, we have not entered into any transactions, nor are there any currently proposed transactions, between us and a related party where the amount involved exceeds, or would exceed, \$120,000, and in which any related person had or will have a direct or indirect material interest. We believe the terms of the transactions described above were comparable to terms we could have obtained in arm's-length dealings with unrelated third parties.

Policies and Procedures for Related Party Transactions

Prior to the consummation of this offering, our board of directors will adopt a written related person transaction policy, to be effective upon the consummation of this offering, setting forth the policies and procedures for the review and approval or ratification of related person transactions. This policy will cover, with certain exceptions set forth in Item 404 of Regulation S-K under the Securities Act, any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships in which we were or are to be a participant, where the amount involved exceeds \$120,000 and a related person had or will have a direct or indirect material interest, including without limitation purchases of goods or services by or from the related person or entities in which the related person has a material interest, indebtedness, guarantees of indebtedness and employment by us of a related person. In reviewing and approving any such transactions, our audit committee is tasked to consider all relevant facts and circumstances, including but not limited to whether the transaction is on terms comparable to those that could be obtained in an arm's length transaction with an unrelated third party and the extent of the related person's interest in the transaction. All of the transactions described in this section occurred prior to the adoption of this policy.

PRINCIPAL STOCKHOLDERS

The following table sets forth information relating to the beneficial ownership of our common stock as of November 13, 2020, by:

- each person, or group of affiliated persons, known by us to beneficially own more than 5% of our outstanding shares of our common stock;
- each of our directors;
- each of our named executives;
- all directors and executive officers as a group.

The number of shares beneficially owned by each entity, person, director or executive officer is determined in accordance with the rules of the SEC, and the information is not necessarily indicative of beneficial ownership for any other purpose. Under such rules, beneficial ownership includes any shares over which the individual has sole or shared voting power or investment power as well as any shares that the individual has the right to acquire within 60 days after November 13, 2020 through the exercise of any stock option, warrants or other rights. Except as otherwise indicated, and subject to applicable community property laws, the persons named in the table have sole voting and investment power with respect to all shares of our common stock held by that person.

The percentage of shares beneficially owned is computed on the basis of 16,833,726 shares of our common stock outstanding as of November 13, 2020, which reflects the automatic conversion of 11,575,984 shares of our outstanding shares of redeemable convertible preferred stock into an equivalent number of shares of our common stock. Shares of our common stock that a person has the right to acquire within 60 days after November 13, 2020 are deemed outstanding for purposes of computing the percentage ownership of the person holding such rights, but are not deemed outstanding for purposes of computing the percentage ownership of any other person, except with respect to the percentage ownership of all directors and executive officers as a group. Unless otherwise indicated below, the address for each beneficial owner listed is c/o 4D Molecular Therapeutics, Inc., 5858 Horton Street #455, Emeryville, California 94608.

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Name of Beneficial Owner	Number of Outstanding Shares Beneficially Owned	Number of Shares Exercisable Within 60 Days	Number of Shares Beneficially Owned	Number of Shares Owned After the Offering	Percentage of Beneficial Ownership	
					Before Offering	After Offering
5% and Greater Stockholders:						
Viking Global Opportunities Illiquid Investments Sub-Master LP(1)	2,837,914	—	2,837,914	2,837,914	16.9%	13.1%
Entities Affiliated with Pfizer(2)	1,641,658	—	1,641,658	1,641,658	9.7%	7.6%
Entities Affiliated with BVF(3)	906,070	—	906,070	906,070	5.4%	4.2%
Executive Officers and Directors:						
David Kirn, M.D.(4)	2,000,000	—	2,000,000	2,000,000	11.9%	9.3%
John F. Milligan, Ph.D	—	—	—	—	*	*
William Burkoth, MBA	—	—	—	—	*	*
Jacob Chacko, M.D(5)	—	21,874	21,874	21,847	*	*
Susannah Gray, MBA	—	—	—	—	*	*
Nancy Miller-Rich	—	—	—	—	*	*
David Schaffer, Ph.D.(6)	2,000,000	—	2,000,000	2,000,000	11.9%	9.3%
Charles Theuer, M.D., Ph.D.(7)	32,351	45,517	77,868	77,868	*	*
Shawn Cline Tomasello, MBA	—	—	—	—	*	*
Tony Yao, M.D., Ph.D.(8)	638,744	—	638,744	638,744	3.8%	3.0%
August Moretti(9)	—	112,530	112,530	112,530	*	*
Peter Francis, M.D., Ph.D.(10)	—	145,284	145,284	145,284	*	*
All executive officers and directors as a group (12 persons)	4,671,095	325,205	4,996,300	4,996,300	29.7%	23.1%

* Indicates beneficial ownership of less than 1% of our total outstanding common stock.

- (1) Consists of (i) 2,004,581 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock and (ii) 833,333 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock held by Viking Global Opportunities Illiquid Investments Sub-Master LP (Opportunities Fund). Opportunities Fund has the authority to dispose of and vote the shares directly owned by it, which power may be exercised by its general partner, Viking Global Opportunities Portfolio GP LLC (Opportunities GP), and by Viking Global Investors LP (VGI), which provides managerial services to Opportunities Fund. O. Andreas Halvorsen, David C. Ott and Rose Shabet, as Executive Committee members of Viking Global Partners LLC (the general partner of VGI) and Opportunities GP, have shared authority to direct the voting and disposition of investments beneficially owned by the Opportunities Fund and Opportunities GP. The business address of each of the entities is c/o Viking Global Investors LP, 55 Railroad Avenue, Greenwich, CT 06830.
- (2) Consists of (i) 1,131,350 shares of our common stock issuable upon the conversion of our Series A-1 redeemable convertible preferred stock directly held by Pfizer Ventures (US) LLC, (ii) 343,642 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Pfizer Inc. and (iii) 166,666 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock directly held by Pfizer Ventures (US) LLC. Pfizer Inc. is the parent company to Pfizer Ventures (US) LLC and may be deemed to beneficially own the shares directly owned by Pfizer Ventures (US) LLC. William Burkoth, a member of our board of directors, is an employee of Pfizer Inc. The address for these entities is 235 East 42nd Street, New York, NY 10017.
- (3) Consists of (i) 275,971 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Biotechnology Value Fund, L.P. (BVF), (ii) 206,047 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Biotechnology Value Fund II, L.P. (BVF2), (iii) 40,909 shares of our common stock issuable upon the conversion of our Series B redeemable convertible

preferred stock directly held by Biotechnology Value Trading Fund OS, L.P. (Trading Fund OS), (iv) 49,810 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by certain Partners managed accounts (Partners Managed Accounts), (v) 177,672 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock directly held by BVF, (vi) 132,703 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock directly held by BVF2 and (vii) 22,958 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock directly held by Biotechnology Value Trading Fund OS, L.P. BVF I GP L.L.C. (BVF GP), as the general partner of BVF, may be deemed to beneficially own the shares beneficially owned by BVF. BVF II GP L.L.C. (BVF2 GP), as the general partner of BVF2, may be deemed to beneficially own the shares beneficially owned by BVF2. BVF Partners OS Ltd. (Partners OS), as the general partner of Trading Fund OS, may be deemed to beneficially own the shares beneficially owned by Trading Fund OS. BVF GP Holdings L.L.C. (BVF GPH), as the sole member of each of BVF GP and BVF2 GP, may be deemed to beneficially own the shares beneficially owned in the aggregate by BVF and BVF2. BVF Partners L.P., (Partners) as the general partner of BVF, BVF2, the investment manager of Trading Fund OS, and the sole member of Partners OS, may be deemed to beneficially own the shares beneficially owned by BVF, BVF2, Trading Fund OS and Partners Managed Accounts. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the shares beneficially owned by Partners. Mark Lampert, as a director and officer of BVF Inc., has voting and disposition power over the shares and may be deemed to beneficially own the shares beneficially owned by BVF Inc. Mark Lampert disclaims beneficial ownership of the shares except to the extent of his pecuniary interest therein. The address for BVF Partners L.P. is 44 Montgomery Street 40th Floor, San Francisco, CA 94104.

- (4) Consists of 2,000,000 shares of our common stock.
- (5) Consists of 21,874 shares of our common stock that may be acquired pursuant to the exercise of stock options within 60 days of November 13, 2020.
- (6) Consists of 2,000,000 shares of our common stock directly held by the Shaffer-Hinh Family Trust.
- (7) Consists of (i) 32,351 shares of our common stock and (ii) 45,517 shares of our common stock that may be acquired pursuant to the exercise of stock options within 60 days of November 13, 2020.
- (8) Consists of 2,864 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock held directly by Dr. Yao and, (i) 1,432 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by CF Ascent LLC, (ii) 50,830 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Iron Horse Investments, LLC, (iii) 5,727 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Lookfar Investments, LLC, (iv) 229,095 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Meridian Small Cap Growth Fund, (v) 50,830 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by THB Iron Rose LLC, (vi) 2,864 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by THB Iron Rose LLC, Life Sciences Portfolio, (vii) 57,274 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Arrowmark Fundamental Opportunity Fund L.P., (viii) 57,274 shares of our common stock issuable upon the conversion of our Series B redeemable convertible preferred stock directly held by Arrowmark Life Science Fund, LP, (ix) 27,777 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock directly held by Arrowmark Life Science Fund, LP and (x) 152,777 shares of our common stock issuable upon the conversion of our Series C redeemable convertible preferred stock directly held by Iron Horse Investments, LLC, which are referred to collectively as the ArrowMark Funds. ArrowMark Colorado Holdings LLC (ArrowMark Colorado) is investment advisor to ArrowMark Funds. Dr. Yao, one of our directors, is employed as a portfolio manager for ArrowMark Colorado and

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has direct voting and dispositive control over the shares held by the ArrowMark Funds. Dr. Yao may be considered the beneficial owner of the shares held by ArrowMark Funds and disclaims beneficial ownership of such shares, except to the extent of any pecuniary interest therein. The principal business address of the ArrowMark Funds is 100 Fillmore Street, Suite 325, Denver, Colorado 80206.

- (9) Consists of 112,530 shares of our common stock that may be acquired pursuant to the exercise of stock options within 60 days of November 13, 2020.
- (10) Consists of 145,284 shares of our common stock that may be acquired pursuant to the exercise of stock options within 60 days of November 13, 2020.

DESCRIPTION OF CAPITAL STOCK

The following summary describes our capital stock and the material provisions of our amended and restated certificate of incorporation and our amended and restated bylaws, which will become effective immediately prior to the consummation of this offering, the amended and restated investors' rights agreement to which we and certain of our stockholders are parties and of the Delaware General Corporation Law. Because the following is only a summary, it does not contain all of the information that may be important to you. For a complete description, you should refer to our amended and restated certificate of incorporation, amended and restated bylaws and amended and restated investors' rights agreement, copies of which have been filed as exhibits to the registration statement of which this prospectus is part.

General

Immediately prior to the closing of this offering, we will file our amended and restated certificate of incorporation that authorizes 300,000,000 shares of common stock, \$0.0001 par value per share, and 10,000,000 shares of preferred stock, \$0.0001 par value per share. As of September 30, 2020, there were outstanding:

- 16,833,726 shares of our common stock, on an as-converted basis, held by approximately 77 stockholders of record; and
- 2,928,321 shares of our common stock issuable upon exercise of outstanding stock options.

In connection with this offering, we expect to consummate a forward stock split of our outstanding common stock at a ratio to be determined.

Common Stock

Voting Rights

Each holder of our common stock is entitled to one vote for each share on all matters submitted to a vote of the stockholders, including the election of directors. Our stockholders do not have cumulative voting rights in the election of directors. Accordingly, holders of a majority of the voting shares are able to elect all of the directors. In addition, the affirmative vote of holders of 66 2/3% of the voting power of all of the then outstanding voting stock will be required to take certain actions, including amending certain provisions of our amended and restated certificate of incorporation, such as the provisions relating to amending our amended and restated bylaws, the classified board and director liability.

Dividends

Subject to preferences that may be applicable to any then outstanding preferred stock, holders of our common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Liquidation

In the event of our liquidation, dissolution or winding up, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then outstanding shares of preferred stock.

Rights and Preferences

Holders of our common stock have no preemptive, conversion, subscription or other rights, and there are no redemption or sinking fund provisions applicable to our common stock. The rights, preferences and privileges of the holders of our common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of our preferred stock that we may designate in the future.

Fully Paid and Nonassessable

All of our outstanding shares of common stock are, and the shares of our common stock to be issued in this offering will be, fully paid and nonassessable.

Redeemable Convertible Preferred Stock

Immediately prior to the consummation of this offering, all outstanding shares of our redeemable convertible preferred stock will be converted into shares of our common stock. See Note 10 to our audited financial statements included elsewhere in this prospectus for a description of our currently outstanding redeemable convertible preferred stock. Immediately prior to the consummation of this offering, our amended and restated certificate of incorporation will be amended and restated to delete all references to such shares of redeemable convertible preferred stock. From and after the consummation of this offering, our board of directors will have the authority, without further action by our stockholders, to issue up to 10,000,000 shares of preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences, sinking fund terms and the number of shares constituting, or the designation of, such series, any or all of which may be greater than the rights of our common stock. The issuance of our preferred stock could adversely affect the voting power of holders of our common stock and the likelihood that such holders will receive dividend payments and payments upon our liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deferring or preventing a change in control or other corporate action. Immediately after consummation of this offering, no shares of preferred stock will be outstanding, and we have no present plan to issue any shares of preferred stock.

Options

As of September 30, 2020, we had outstanding options to purchase 2,928,321 shares of our common stock, with a per share weighted-average exercise price of \$9.11, under our 2015 Equity Incentive Plan.

Warrants

As of September 30, 2020, we had warrants outstanding with the option to purchase 68,669 shares of our common stock, with a weighted-average exercise price of \$1.85 per share.

Registration Rights

Under our amended and restated investors' rights agreement, based on the number of shares outstanding as of September 30, 2020, following the consummation of this offering, the holders of 11.6 million shares of our common stock, or their transferees, have the right to require us to register their shares under the Securities Act so that those shares may be publicly resold, and the holders of 11.6 million shares of our common stock, or their transferees, have the right to include their shares in any registration statement we file, in each case as described below.

Demand Registration Rights

Based on the number of shares outstanding as of September 30, 2020, after the consummation of this offering, the holders of 11.6 million shares of our common stock (on an as-converted basis), or their transferees, will be entitled to certain demand registration rights. Beginning 180 days following the effectiveness of the registration statement of which this prospectus is a part, the holders of at least 50% of these shares can, on not more than two occasions, request that we register all or a portion of their shares if the aggregate price to the public of the shares offered is at least \$30.0 million (before deductions of underwriters' commissions and expenses). Additionally, we will not be required to effect a demand registration during the period beginning 60 days prior to the filing and ending 180 days following the effectiveness of a company-initiated registration statement relating to an initial public offering of our securities.

Piggyback Registration Rights

Based on the number of shares outstanding as of September 30, 2020, after the consummation of this offering, in the event that we determine to register any of our securities under the Securities Act (subject to certain exceptions), either for our own account or for the account of other security holders, the holders of 11.6 million shares of our common stock (on an as-converted basis), or their transferees, will be entitled to certain "piggyback" registration rights allowing the holders to include their shares in such registration, subject to certain marketing and other limitations. As a result, whenever we propose to file a registration statement under the Securities Act, other than with respect to a registration related to employee benefit plans, the offer and sale of debt securities, or corporate reorganizations or certain other transactions, the holders of these shares are entitled to notice of the registration and have the right, subject to limitations that the underwriters may impose on the number of shares included in the registration, to include their shares in the registration. In an underwritten offering, the managing underwriter, if any, has the right, subject to specified conditions, to exclude or limit the number of shares such holders may include.

Form S-3 Registration Rights

Based on the number of shares outstanding as of September 30, 2020, after the consummation of this offering, the holders of 11.6 million shares of our common stock (on an as-converted basis), or their transferees, will be entitled to certain Form S-3 registration rights. The holders of at least 30% of the registrable securities then outstanding of these shares can make a written request that we register their shares on Form S-3 if we are eligible to file a registration statement on Form S-3 and if the aggregate price to the public of the shares offered is at least \$5.0 million (before deductions of underwriters' commissions and expenses). These stockholders may make an unlimited number of requests for registration on Form S-3, but in no event shall we be required to file more than two registrations on Form S-3 in any given twelve-month period.

Expenses of Registration

We will pay the registration expenses of the holders of the shares registered pursuant to the demand, piggyback and Form S-3 registration rights described above, including the expenses in an amount not to exceed \$25,000 of one special counsel for the selling holders.

Expiration of Registration Rights

The demand, piggyback and Form S-3 registration rights described above will expire, with respect to any particular stockholder, upon the earlier of five years after the consummation of this offering or when that stockholder can sell all of its shares under Rule 144 of the Securities Act during any three-month period (and without the requirement for us to be in compliance with the current public information required under Section c(1) of Rule 144 of the Securities Act).

Anti-Takeover Effects of Provisions of Our Amended and Restated Certificate of Incorporation, Our Amended and Restated Bylaws and Delaware Law

Certain provisions of Delaware law and our amended and restated certificate of incorporation and our amended and restated bylaws that will become effective immediately prior to the consummation of this offering contain provisions that could make the following transactions more difficult: acquisition of us by means of a tender offer; acquisition of us by means of a proxy contest or otherwise; or removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions that might result in a premium over the market price for our shares.

These provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Delaware Anti-Takeover Statute

We are subject to Section 203 of the Delaware General Corporation Law, which prohibits persons deemed “interested stockholders” from engaging in a “business combination” with a publicly-held Delaware corporation for three years following the date these persons become interested stockholders unless the business combination is, or the transaction in which the person became an interested stockholder was, approved in a prescribed manner or another prescribed exception applies. Generally, an “interested stockholder” is a person who, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation’s voting stock. Generally, a “business combination” includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. The existence of this provision may have an anti-takeover effect with respect to transactions not approved in advance by our board of directors, such as discouraging takeover attempts that might result in a premium over the market price of our common stock.

Undesignated Preferred Stock

The ability to authorize undesignated preferred stock will make it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of us. These and other provisions may have the effect of deterring hostile takeovers or delaying changes in control or management.

Special Stockholder Meetings

Our amended and restated bylaws will provide that a special meeting of stockholders may be called at any time by our board of directors, or our President or Chief Executive Officer, but such special meetings may not be called by our stockholders or any other person or persons.

Requirements for Advance Notification of Stockholder Nominations and Proposals

Our amended and restated bylaws will establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors, other than nominations made by or at the direction of our board of directors or a committee of our board of directors.

Elimination of Stockholder Action by Written Consent

Our amended and restated certificate of incorporation and our amended and restated bylaws will eliminate the right of stockholders to act by written consent without a meeting.

Classified Board; Election and Removal of Directors; Filling Vacancies

Effective upon the consummation of this offering, our board of directors will be divided into three classes. The directors in each class will serve for a three-year term, one class being elected each year by our stockholders, with staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because our stockholders do not have cumulative voting rights, our stockholders holding a majority of the shares of our common stock outstanding will be able to elect all of our directors. Our amended and restated certificate of incorporation will provide for the removal of any of our directors only for cause and requires a stockholder vote by the holders of at least a 66 2/3% of the voting power of the then outstanding voting stock. For more information on the classified board, see the section titled "Management—Board Composition." Furthermore, any vacancy on our board of directors, however occurring, including a vacancy resulting from an increase in the size of our board of directors, may only be filled by a resolution of our board of directors unless our board of directors determines that such vacancies shall be filled by our stockholders. This system of electing and removing directors and filling vacancies may tend to discourage a third party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors.

Choice of Forum

Our amended and restated certificate of incorporation and amended and restated bylaws will provide that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law: any derivative action or proceeding brought on our behalf; any action asserting a claim of breach of fiduciary duty owed by any of our directors, officers or stockholders to us or to our stockholders; any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws (as either may be amended from time to time); or any action asserting a claim against us that is governed by the internal affairs doctrine. As a result, any action brought by any of our stockholders with regard to any of these matters will need to be filed in the Court of Chancery of the State of Delaware and cannot be filed in any other jurisdiction; provided that, the exclusive forum provision will not apply to suits brought to enforce any liability or duty created by the Exchange Act or any other claim for which the federal courts have exclusive jurisdiction; and provided further that, if and only if the Court of Chancery of the State of Delaware dismisses any such action for lack of subject matter jurisdiction, such action may be brought in another state or federal court sitting in the State of Delaware. Our amended and restated certificate of incorporation and amended and restated bylaws will also provide that the federal district courts of the United States of America will be the exclusive forum for the resolution of any complaint asserting a cause of action against us or any of our directors, officers, employees or agents and arising under the Securities Act. Nothing in our amended and restated certificate of incorporation and amended and restated bylaws preclude stockholders that assert claims under the Exchange Act from bringing such claims in state or federal court, subject to applicable law.

If any action the subject matter of which is within the scope described above is filed in a court other than a court located within the State of Delaware, or a Foreign Action, in the name of any stockholder, such stockholder shall be deemed to have consented to the personal jurisdiction of the

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state and federal courts located within the State of Delaware in connection with any action brought in any such court to enforce the applicable provisions of our amended and restated certificate of incorporation and amended and restated bylaws and having service of process made upon such stockholder in any such action by service upon such stockholder's counsel in the Foreign Action as agent for such stockholder. Although our amended and restated certificate of incorporation and amended and restated bylaws will contain the choice of forum provision described above, it is possible that a court could find that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable.

This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or any of our directors, officers, other employees or stockholders, which may discourage lawsuits with respect to such claims, although our stockholders will not be deemed to have waived our compliance with federal securities laws and the rules and regulations thereunder.

Amendment of Charter Provisions

The amendment of any of the above provisions in our amended and restated certificate of incorporation, except for the provision making it possible for our board of directors to issue undesignated preferred stock, would require approval by a stockholder vote by the holders of at least a 66 2/3% of the voting power of the then outstanding voting stock.

The provisions of the Delaware General Corporation Law, our amended and restated certificate of incorporation and our amended and restated bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Limitations of Liability and Indemnification Matters

For a discussion of liability and indemnification, see the section titled "Management—Limitation on Liability and Indemnification Matters."

Listing

We have applied to have our common stock listed on the Nasdaq Global Market under the symbol "FDMT."

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company, LLC. The transfer agent and registrar's address is 6201 15th Avenue, Brooklyn, New York 11219.

SHARES ELIGIBLE FOR FUTURE SALE

Prior to this offering, there has been no public market for our common stock. Future sales of our common stock, including shares issued upon the exercise of outstanding options or warrants, in the public market after this offering, or the perception that those sales may occur, could cause the prevailing market price for our common stock to fall or impair our ability to raise equity capital in the future. As described below, only a limited number of shares of our common stock will be available for sale in the public market for a period of several months after consummation of this offering due to contractual and legal restrictions on resale described below. Future sales of our common stock in the public market either before (to the extent permitted) or after restrictions lapse, or the perception that those sales may occur, could adversely affect the prevailing market price of our common stock at such time and our ability to raise equity capital at a time and price we deem appropriate.

Sale of Restricted Shares

Based on the number of shares of our common stock outstanding as of September 30, 2020 and assuming an initial public offering price of \$21.00 per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, upon the consummation of this offering and assuming (i) the automatic conversion of all shares of our outstanding Series A, Series A-1, Series B and Series C redeemable convertible preferred stock as of September 30, 2020, (ii) no exercise of the underwriters' option to purchase additional shares and (iii) no exercise of any of our outstanding options or warrants, we will have outstanding an aggregate of 21,595,630 shares of our common stock. Of these shares, all of the shares of our common stock to be sold in this offering, and any shares sold upon exercise of the underwriters' option to purchase additional shares, will be freely tradable in the public market without restriction or further registration under the Securities Act, unless the shares are held by any of our "affiliates" as such term is defined in Rule 144 of the Securities Act. All remaining shares of our common stock held by existing stockholders immediately prior to the consummation of this offering will be "restricted securities" as such term is defined in Rule 144. These restricted securities were issued and sold by us, or will be issued and sold by us, in private transactions and are eligible for public sale only if registered under the Securities Act or if they qualify for an exemption from registration under the Securities Act, including the exemptions provided by Rule 144 or Rule 701, which rules are summarized below.

As a result of the lock-up agreements referred to below and the provisions of Rule 144 and Rule 701 under the Securities Act, based on the number of shares of our common stock outstanding as of September 30, 2020 and assumptions (i)-(iii) described above, the shares of our common stock (excluding the shares sold in this offering) that will be available for sale in the public market, subject (A) to any waivers by the underwriters and/or our board of directors under the respective lock-up agreements and (B) with respect to shares held by directors, executive officers and other affiliates, the volume limitations under Rule 144 under the Securities Act, are as follows:

Approximate Number of Shares	First Date Available for Sale into Public Market
16,833,726 shares	180 days after the date of this prospectus upon expiration of the lock-up agreements referred to below, subject in some cases to applicable volume limitations under Rule 144

Lock-Up Agreements

In connection with this offering, we, our executive officers, our directors and substantially all of our securityholders have agreed, subject to certain exceptions, with the underwriters not to dispose of or hedge any shares of our common stock or securities convertible into or exchangeable for shares of

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our common stock during the period from the date of the lock-up agreement continuing through the date 180 days after the date of this prospectus, except with the prior written consent of Goldman Sachs & Co. LLC, BofA Securities, Inc. and Evercore Group L.L.C. on behalf of the underwriters.

Prior to the completion of the offering, certain of our employees, including our executive officers, and/or directors may enter into written trading plans that are intended to comply with Rule 10b5-1 under the Exchange Act. Sales under these trading plans would not be permitted until the expiration of the lock-up agreements relating to the offering described above.

Following the lock-up periods set forth in the agreements described above, and assuming that the representatives of the underwriters do not release any parties from these agreements, all of the shares of our common stock that are restricted securities or are held by our affiliates as of the date of this prospectus will be eligible for sale in the public market in compliance with Rule 144 under the Securities Act.

Rule 144

In general, under Rule 144, as currently in effect, once we have been subject to the public company reporting requirements of the Exchange Act for at least 90 days, a person (or persons whose shares are required to be aggregated) who is not deemed to have been one of our "affiliates" for purposes of Rule 144 at any time during the three months preceding a sale, and who has beneficially owned restricted securities within the meaning of Rule 144 for at least six months, including the holding period of any prior owner other than one of our "affiliates," is entitled to sell those shares in the public market (subject to the lock-up agreement referred to above, if applicable) without complying with the manner of sale, volume limitations or notice provisions of Rule 144, but subject to compliance with the public information requirements of Rule 144. If such a person has beneficially owned the shares proposed to be sold for at least one year, including the holding period of any prior owner other than "affiliates," then such person is entitled to sell such shares in the public market without complying with any of the requirements of Rule 144 (subject to the lock-up agreement referred to above, if applicable). In general, under Rule 144, as currently in effect, once we have been subject to the public company reporting requirements of the Exchange Act for at least 90 days, our "affiliates," as defined in Rule 144, who have beneficially owned the shares proposed to be sold for at least six months are entitled to sell in the public market, upon expiration of any applicable lock-up agreements and within any three-month period, a number of those shares of our common stock that does not exceed the greater of:

- 1% of the number of shares of common stock then outstanding, which will equal approximately 215,956 shares of our common stock immediately after this offering (calculated as of September 30, 2020 on the basis of the assumptions (i)-(iii) described above); or
- the average weekly trading volume of our common stock on The Nasdaq Global Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Such sales under Rule 144 by our "affiliates" or persons selling shares on behalf of our "affiliates" are also subject to certain manner of sale provisions, notice requirements and to the availability of current public information about us. Notwithstanding the availability of Rule 144, the holders of substantially all of our restricted securities have entered into lock-up agreements as referenced above and their restricted securities will become eligible for sale (subject to the above limitations under Rule 144) upon the expiration of the restrictions set forth in those agreements.

Rule 701

In general, under Rule 701 as currently in effect, any of our employees, directors, officers, consultants or advisors who acquired common stock from us in connection with a written

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compensatory stock or option plan or other written agreement in compliance with Rule 701 under the Securities Act before the effective date of the registration statement of which this prospectus is a part (to the extent such common stock is not subject to a lock-up agreement) is entitled to rely on Rule 701 to resell such shares beginning 90 days after we become subject to the public company reporting requirements of the Exchange Act in reliance on Rule 144, but without compliance with the holding period requirements contained in Rule 144. Accordingly, subject to any applicable lock-up agreements, beginning 90 days after we become subject to the public company reporting requirements of the Exchange Act, under Rule 701 persons who are not our “affiliates,” as defined in Rule 144, may resell those shares without complying with the minimum holding period or public information requirements of Rule 144, and persons who are our “affiliates” may resell those shares without compliance with Rule 144’s minimum holding period requirements (subject to the terms of the lock-up agreement referred to above).

Registration Rights

Based on the number of shares outstanding as of September 30, 2020, after the consummation of this offering, the holders of 11.6 million shares of our common stock, or their transferees, will, subject to the lock-up agreements referred to above, be entitled to certain rights with respect to the registration of the offer and sale of those shares under the Securities Act. For a description of these registration rights, see the section titled “Description of Capital Stock—Registration Rights.” If the offer and sale of these shares are registered, they will be freely tradable without restriction under the Securities Act.

Stock Plans

We intend to file with the SEC a registration statement under the Securities Act covering the shares of our common stock that we may issue upon exercise of outstanding options reserved for issuance under our 2015 Equity Incentive Plan and our 2020 Plan. Such registration statement is expected to be filed and become effective as soon as practicable after the consummation of this offering. Accordingly, shares registered under such registration statement will be available for sale in the open market following its effective date, subject to Rule 144 volume limitations and the lock-up agreements described above, if applicable.

MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES TO NON-U.S. HOLDERS

The following discussion is a summary of the material U.S. federal income tax consequences to Non-U.S. Holders (as defined below) of the purchase, ownership and disposition of our common stock issued pursuant to this offering, but does not purport to be a complete analysis of all potential tax effects. The effects of other U.S. federal tax laws, such as estate and gift tax laws, and any applicable state, local or non-U.S. tax laws are not discussed. This discussion is based on the Code, Treasury Regulations promulgated thereunder, judicial decisions, and published rulings and administrative pronouncements of the IRS, in each case in effect as of the date hereof. These authorities may change or be subject to differing interpretations. Any such change or differing interpretation may be applied retroactively in a manner that could adversely affect a Non-U.S. Holder. We have not sought and will not seek any rulings from the IRS regarding the matters discussed below. There can be no assurance the IRS or a court will not take a contrary position to that discussed below regarding the tax consequences of the purchase, ownership and disposition of our common stock.

This discussion is limited to Non-U.S. Holders that hold our common stock as a “capital asset” within the meaning of Section 1221 of the Code (generally, property held for investment). This discussion does not address all U.S. federal income tax consequences relevant to a Non-U.S. Holder’s particular circumstances, including the impact of the Medicare contribution tax on net investment income. In addition, it does not address consequences relevant to Non-U.S. Holders subject to special rules, including, without limitation:

- U.S. expatriates and former citizens or long-term residents of the United States;
- persons subject to the alternative minimum tax;
- persons holding our common stock as part of a hedge, straddle or other risk reduction strategy or as part of a conversion transaction or other integrated investment;
- banks, insurance companies, and other financial institutions;
- brokers, dealers or traders in securities;
- “controlled foreign corporations,” “passive foreign investment companies” and corporations that accumulate earnings to avoid U.S. federal income tax;
- partnerships or other entities or arrangements treated as partnerships for U.S. federal income tax purposes (and investors therein);
- tax-exempt organizations or governmental organizations;
- persons deemed to sell our common stock under the constructive sale provisions of the Code;
- tax-qualified retirement plans; and
- “qualified foreign pension funds” as defined in Section 897(l)(2) of the Code and entities all of the interests of which are held by qualified foreign pension funds.

If an entity treated as a partnership for U.S. federal income tax purposes holds our common stock, the tax treatment of a partner in the partnership will depend on the status of the partner, the activities of the partnership and certain determinations made at the partner level. Accordingly, partnerships holding our common stock and the partners in such partnerships should consult their tax advisors regarding the U.S. federal income tax consequences to them.

THIS DISCUSSION IS NOT TAX ADVICE. INVESTORS SHOULD CONSULT THEIR TAX ADVISORS WITH RESPECT TO THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS

TO THEIR PARTICULAR SITUATIONS AS WELL AS ANY TAX CONSEQUENCES OF THE PURCHASE, OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK ARISING UNDER THE U.S. FEDERAL ESTATE OR GIFT TAX LAWS OR UNDER THE LAWS OF ANY STATE, LOCAL OR NON-U.S. TAXING JURISDICTION OR UNDER ANY APPLICABLE INCOME TAX TREATY.

Definition of Non-U.S. Holder

For purposes of this discussion, a “Non-U.S. Holder” is any beneficial owner of our common stock that is neither a “U.S. person” nor an entity treated as a partnership for U.S. federal income tax purposes. A U.S. person is any person that, for U.S. federal income tax purposes, is or is treated as any of the following:

an individual who is a citizen or resident of the United States;

a corporation created or organized under the laws of the United States, any state thereof, or the District of Columbia;

an estate, the income of which is subject to U.S. federal income tax regardless of its source; or

a trust that (i) is subject to the primary supervision of a U.S. court and all substantial decisions of which are subject to the control of one or more “United States persons” (within the meaning of Section 7701(a)(30) of the Code), or (ii) has a valid election in effect to be treated as a United States person for U.S. federal income tax purposes.

Distributions

As described in the section titled “Dividend Policy,” we do not anticipate paying any cash dividends in the foreseeable future. However, if we do make distributions of cash or property on our common stock, such distributions will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Amounts not treated as dividends for U.S. federal income tax purposes will constitute a return of capital and first be applied against and reduce a Non-U.S. Holder’s adjusted tax basis in its common stock, but not below zero. Any excess will be treated as capital gain and will be treated as described below under “—Sale or Other Taxable Disposition.”

Subject to the discussion below on effectively connected income, dividends paid to a Non-U.S. Holder will be subject to U.S. federal withholding tax at a rate of 30% of the gross amount of the dividends (or such lower rate specified by an applicable income tax treaty, provided the Non-U.S. Holder furnishes a valid IRS Form W-8BEN or W-8BEN-E (or other applicable documentation) certifying qualification for the lower treaty rate). A Non-U.S. Holder that does not timely furnish the required documentation, but that qualifies for a reduced treaty rate, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. Non-U.S. Holders should consult their tax advisors regarding their entitlement to benefits under any applicable tax treaties.

If dividends paid to a Non-U.S. Holder are effectively connected with the Non-U.S. Holder’s conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such dividends are attributable), the Non-U.S. Holder will be exempt from the U.S. federal withholding tax described above. To claim the exemption, the Non-U.S. Holder must furnish to the applicable withholding agent a valid IRS Form W-8ECI, certifying that the dividends are effectively connected with the Non-U.S. Holder’s conduct of a trade or business within the United States.

Any such effectively connected dividends will be subject to U.S. federal income tax on a net income basis at the regular rates. A Non-U.S. Holder that is a corporation also may be subject to a

branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected dividends, as adjusted for certain items. Non-U.S. Holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Sale or Other Taxable Disposition

Subject to the discussion below regarding backup withholding, a Non-U.S. Holder will not be subject to U.S. federal income tax on any gain realized upon the sale or other taxable disposition of our common stock unless:

- the gain is effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such gain is attributable);
- the Non-U.S. Holder is a nonresident alien individual present in the United States for 183 days or more during the taxable year of the disposition and certain other requirements are met; or
- our common stock constitutes a U.S. real property interest (USRPI) by reason of our status as a U.S. real property holding corporation (USRPHC) for U.S. federal income tax purposes.

Gain described in the first bullet point above generally will be subject to U.S. federal income tax on a net income basis at the regular rates. A Non-U.S. Holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected gain, as adjusted for certain items.

A Non-U.S. Holder described in the second bullet point above will be subject to U.S. federal income tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on gain realized upon the sale or other taxable disposition of our common stock, which may be offset by certain U.S. source capital losses of the Non-U.S. Holder (even though the individual is not considered a resident of the United States), provided the Non-U.S. Holder has timely filed U.S. federal income tax returns with respect to such losses.

With respect to the third bullet point above, we believe we currently are not, and do not anticipate becoming, a USRPHC. Because the determination of whether we are a USRPHC depends, however, on the fair market value of our USRPis relative to the fair market value of our non-U.S. real property interests and our other business assets, there can be no assurance we currently are not a USRPHC or will not become one in the future. Even if we are or were to become a USRPHC, gain arising from the sale or other taxable disposition by a Non-U.S. Holder will not be subject to U.S. federal income tax if our common stock is "regularly traded," as defined by applicable Treasury Regulations, on an established securities market, and such Non-U.S. Holder owned, actually and constructively, 5% or less of our common stock throughout the shorter of the five-year period ending on the date of the sale or other taxable disposition or the Non-U.S. Holder's holding period.

Non-U.S. Holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Information Reporting and Backup Withholding

Payments of dividends on our common stock will not be subject to backup withholding, provided the Non-U.S. Holder certifies its non-U.S. status, such as by furnishing a valid IRS Form W-8BEN, W-8BEN-E or W-8ECI, or otherwise establishes an exemption. However, information returns are required to be filed with the IRS in connection with any distributions on our common stock paid to the

Non-U.S. Holder, regardless of whether any tax was actually withheld. In addition, proceeds of the sale or other taxable disposition of our common stock within the United States or conducted through certain U.S.-related brokers generally will not be subject to backup withholding or information reporting if the applicable withholding agent receives the certification described above or the Non-U.S. Holder otherwise establishes an exemption. Proceeds of a disposition of our common stock conducted through a non-U.S. office of a non-U.S. broker that does not have certain enumerated relationships with the United States generally will not be subject to backup withholding or information reporting.

Copies of information returns that are filed with the IRS may also be made available under the provisions of an applicable treaty or agreement to the tax authorities of the country in which the Non-U.S. Holder resides or is established.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules may be allowed as a refund or a credit against a Non-U.S. Holder's U.S. federal income tax liability, provided the required information is timely furnished to the IRS.

Additional Withholding Tax on Payments Made to Foreign Accounts

Withholding taxes may be imposed under Sections 1471 to 1474 of the Code (such Sections commonly referred to as the Foreign Account Tax Compliance Act (FATCA)) on certain types of payments made to non-U.S. financial institutions and certain other non-U.S. entities. Specifically, a 30% withholding tax may be imposed on dividends on, or (subject to the proposed Treasury Regulations discussed below) gross proceeds from the sale or other disposition of, our common stock paid to a "foreign financial institution" or a "non-financial foreign entity" (each as defined in the Code), unless (i) the foreign financial institution undertakes certain diligence and reporting obligations, (ii) the non-financial foreign entity either certifies it does not have any "substantial United States owners" (as defined in the Code) or furnishes identifying information regarding each substantial United States owner, or (iii) the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from these rules. If the payee is a foreign financial institution and is subject to the diligence and reporting requirements in (i) above, it must enter into an agreement with the U.S. Department of the Treasury requiring, among other things, that it undertake to identify accounts held by certain "specified United States persons" or "United States owned foreign entities" (each as defined in the Code), annually report certain information about such accounts, and withhold 30% on certain payments to non-compliant foreign financial institutions and certain other account holders. Foreign financial institutions located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules.

Under the applicable Treasury Regulations and administrative guidance, withholding under FATCA generally applies to payments of dividends on our common stock. While withholding under FATCA would have applied also to payments of gross proceeds from the sale or other disposition of stock on or after January 1, 2019, proposed Treasury Regulations eliminate FATCA withholding on payments of gross proceeds entirely. Taxpayers generally may rely on these proposed Treasury Regulations until final Treasury Regulations are issued.

Prospective investors should consult their tax advisors regarding the potential application of withholding under FATCA to their investment in our common stock.

UNDERWRITING

We and the underwriters named below have entered into an underwriting agreement with respect to the shares being offered. Subject to certain conditions, each underwriter has severally agreed to purchase the number of shares indicated in the following table. Goldman Sachs & Co. LLC, BofA Securities, Inc. and Evercore Group L.L.C. are the representatives of the underwriters.

Underwriters	Number of Shares
Goldman Sachs & Co. LLC	
BofA Securities, Inc.	
Evercore Group L.L.C.	
Total	

The underwriters are committed to take and pay for all of the shares being offered, if any are taken, other than the shares covered by the option described below unless and until this option is exercised.

The underwriters have an option to buy up to an additional 714,285 shares from us to cover sales by the underwriters of a greater number of shares than the total number set forth in the table above. They may exercise that option for 30 days. If any shares are purchased pursuant to this option, the underwriters will severally purchase shares in approximately the same proportion as set forth in the table above.

The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters by us. Such amounts are shown assuming both no exercise and full exercise of the underwriters' option to buy up to an additional 714,285 shares from us.

Per Share	No Exercise	Full Exercise
Total	\$	\$

Shares sold by the underwriters to the public will initially be offered at the initial public offering price set forth on the cover page of this prospectus. Any shares sold by the underwriters to securities dealers may be sold at a discount of up to \$ per share from the initial public offering price. After the initial offering of the shares, the representatives may change the offering price and the other selling terms. The offering of the shares by the underwriters is subject to receipt and acceptance and subject to the underwriters' right to reject any order in whole or in part.

We and our executive officers, directors, and holders of substantially all of our securityholders have agreed or will agree with the underwriters, subject to certain exceptions, not to dispose of or hedge any of our or their common stock or securities convertible into or exchangeable for shares of our common stock during the period from the date of this prospectus continuing through the date 180 days after the date of this prospectus, except with the prior written consent of Goldman Sachs & Co. LLC, BofA Securities, Inc. and Evercore Group L.L.C. This agreement does not apply to any existing employee benefit plans. See the section titled "Shares Eligible for Future Sale" for a discussion of certain transfer restrictions.

Prior to the offering, there has been no public market for the shares. The initial public offering price has been negotiated among us and the representatives. Among the factors to be considered in determining the initial public offering price of the shares, in addition to prevailing market conditions, will

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be our historical performance, estimates of the business potential and earnings prospects, an assessment of our management and the consideration of the above factors in relation to market valuation of companies in related businesses.

We have applied to list our common stock on The Nasdaq Global Market under the symbol “FDMT.”

In connection with the offering, the underwriters may purchase and sell shares of our common stock in the open market. These transactions may include short sales, stabilizing transactions and purchases to cover positions created by short sales. Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in the offering, and a short position represents the amount of such sales that have not been covered by subsequent purchases. A “covered short position” is a short position that is not greater than the amount of additional shares for which the underwriters’ option described above may be exercised. The underwriters may cover any covered short position by either exercising their option or purchasing shares in the open market. In determining the source of shares to cover the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase additional shares pursuant to the option described above. “Naked” short sales are any short sales that create a short position greater than the amount of additional shares for which the option described above may be exercised. The underwriters must cover any such naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market after pricing that could adversely affect investors who purchase in the offering. Stabilizing transactions consist of various bids for or purchases of common stock made by the underwriters in the open market prior to the completion of the offering.

The underwriters may also impose a penalty bid. This occurs when a particular underwriter repays to the underwriters a portion of the underwriting discount received by it because the representatives have repurchased shares sold by or for the account of such underwriter in stabilizing or short covering transactions.

Purchases to cover a short position and stabilizing transactions, as well as other purchases by the underwriters for their own accounts, may have the effect of preventing or retarding a decline in the market price of our common stock, and together with the imposition of the penalty bid, may stabilize, maintain or otherwise affect the market price of our common stock. As a result, the price of our common stock may be higher than the price that otherwise might exist in the open market. The underwriters are not required to engage in these activities and may end any of these activities at any time. These transactions may be effected on The Nasdaq Global Market, in the over-the-counter market or otherwise.

We estimate that our share of the total expenses of the offering, excluding underwriting discounts and commissions, will be approximately \$3.1 million. We have agreed to reimburse the underwriters for certain of their expenses in an amount up to \$.

We have agreed to indemnify the several underwriters against certain liabilities, including liabilities under the Securities Act.

The underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include sales and trading, commercial and investment banking, advisory, investment management, investment research, principal investment, hedging, market making, brokerage and other financial and non-financial activities and services. Certain of the underwriters and their respective affiliates may in the future provide a variety of these services to the issuer and to persons and entities with relationships with the issuer, for which they will receive customary fees and expenses.

In the ordinary course of their various business activities, the underwriters and their respective affiliates, officers, directors and employees may purchase, sell or hold a broad array of investments and actively trade securities, derivatives, loans, commodities, currencies, credit default swaps and other financial instruments for their own account and for the accounts of their customers, and such investment and trading activities may involve or relate to assets, securities or instruments of the issuer (directly, as collateral securing other obligations or otherwise) or persons and entities with relationships with the issuer. The underwriters and their respective affiliates may also communicate independent investment recommendations, market color or trading ideas or publish or express independent research views in respect of such assets, securities or instruments and may at any time hold, or recommend to clients that they should acquire, long and/or short positions in such assets, securities and instruments.

European Economic Area and United Kingdom

In relation to each Member State of the European Economic Area and the United Kingdom (each a Relevant State), no shares have been offered or will be offered pursuant to the offering to the public in that Relevant State prior to the publication of a prospectus in relation to the shares which has been approved by the competent authority in that Relevant State or, where appropriate, approved in another Relevant State and notified to the competent authority in that Relevant State, all in accordance with the Prospectus Regulation), except that offers of shares may be made to the public in that Relevant State at any time under the following exemptions under the Prospectus Regulation:

- (a) to any legal entity which is a qualified investor as defined under the Prospectus Regulation;
- (b) to fewer than 150 natural or legal persons (other than qualified investors as defined under the Prospectus Regulation), subject to obtaining the prior consent of the representatives for any such offer ; or
- (c) in any other circumstances falling within Article 1(4) of the Prospectus Regulation,

provided that no such offer of shares shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Regulation or supplement a prospectus pursuant to Article 23 of the Prospectus Regulation.

For the purposes of this provision, the expression an “offer to the public” in relation to any shares in any Relevant State means the communication in any form and by any means of sufficient information on the terms of the offer and any shares to be offered so as to enable an investor to decide to purchase or subscribe for any shares, and the expression “Prospectus Regulation” means Regulation (EU) 2017/1129.

United Kingdom

Each underwriter has represented and agreed that:

- (a) it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of Section 21 of the Financial Services and Markets Act 2000 (as amended, the FSMA)) received by it in connection with the issue or sale of the shares in circumstances in which Section 21(1) of the FSMA does not apply to the company; and
- (b) it has complied and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to the shares in, from or otherwise involving the United Kingdom.

Canada

The shares may be sold in Canada only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration Requirements, Exemptions, and Ongoing Registrant Obligations. Any resale of the shares must be made in accordance with an exemption form, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory of these rights or consult with a legal advisor.

Pursuant to section 3A.3 of National Instrument 33-105 Underwriting Conflicts (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Hong Kong

The shares may not be offered or sold in Hong Kong by means of any document other than (i) in circumstances which do not constitute an offer to the public within the meaning of the Companies (Winding Up and Miscellaneous Provisions) Ordinance (Cap. 32 of the Laws of Hong Kong) (Companies (Winding Up and Miscellaneous Provisions) Ordinance) or which do not constitute an invitation to the public within the meaning of the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong) (Securities and Futures Ordinance), or (ii) to "professional investors" as defined in the Securities and Futures Ordinance and any rules made thereunder, or (iii) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies (Winding Up and Miscellaneous Provisions) Ordinance, and no advertisement, invitation or document relating to the shares may be issued or may be in the possession of any person for the purpose of issue (in each case whether in Hong Kong or elsewhere), which is directed at, or the contents of which are likely to be accessed or read by, the public in Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" in Hong Kong as defined in the Securities and Futures Ordinance and any rules made thereunder.

Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor (as defined under Section 4A of the Securities and Futures Act, Chapter 289 of Singapore (the SFA)) under Section 274 of the SFA, (ii) to a relevant person (as defined in Section 275(2) of the SFA) pursuant to Section 275(1) of the SFA, or any person pursuant to Section 275(1A) of the SFA, and in accordance with the conditions specified in Section 275 of the SFA or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA, in each case subject to conditions set forth in the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is a corporation (which is not an accredited investor (as defined in Section 4A of the

SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor, the securities (as defined in Section 239(1) of the SFA) of that corporation shall not be transferable for 6 months after that corporation has acquired the shares under Section 275 of the SFA except: (i) to an institutional investor under Section 274 of the SFA or to a relevant person (as defined in Section 275(2) of the SFA), (ii) where such transfer arises from an offer in that corporation's securities pursuant to Section 275(1A) of the SFA, (iii) where no consideration is or will be given for the transfer, (iv) where the transfer is by operation of law, (v) as specified in Section 276(7) of the SFA, or (vi) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore (Regulation 32).

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is a trust (where the trustee is not an accredited investor (as defined in Section 4A of the SFA)) whose sole purpose is to hold investments and each beneficiary of the trust is an accredited investor, the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferable for 6 months after that trust has acquired the shares under Section 275 of the SFA except: (i) to an institutional investor under Section 274 of the SFA or to a relevant person (as defined in Section 275(2) of the SFA), (ii) where such transfer arises from an offer that is made on terms that such rights or interest are acquired at a consideration of not less than S\$200,000 (or its equivalent in a foreign currency) for each transaction (whether such amount is to be paid for in cash or by exchange of securities or other assets), (iii) where no consideration is or will be given for the transfer, (iv) where the transfer is by operation of law, (v) as specified in Section 276(7) of the SFA, or (vi) as specified in Regulation 32.

Solely for the purposes of its obligations pursuant to Section 309B of the SFA, we have determined, and hereby notify all relevant persons (as defined in the CMP Regulations 2018), that the shares are "prescribed capital markets products" (as defined in the CMP Regulations 2018) and Excluded Investment Products (as defined in MAS Notice SFA 04-N12: Notice on the Sale of Investment Products and MAS Notice FAA-N16: Notice on Recommendations on Investment Products).

Japan

The shares have not been and will not be registered under the Financial Instruments and Exchange Act of Japan (Act No. 25 of 1948, as amended) (the FIEA). The shares may not be offered or sold, directly or indirectly, in Japan or to or for the benefit of any resident of Japan (including any person resident in Japan or any corporation or other entity organized under the laws of Japan) or to others for reoffering or resale, directly or indirectly, in Japan or to or for the benefit of any resident of Japan, except pursuant to an exemption from the registration requirements of the FIEA and otherwise in compliance with any relevant laws and regulations of Japan.

Australia

No placement document, prospectus, product disclosure statement or other disclosure document has been lodged with the Australian Securities and Investments Commission (ASIC), in relation to the offering. This offering document does not constitute a prospectus, product disclosure statement or other disclosure document under the Corporations Act 2001 (the Corporations Act), and does not purport to include the information required for a prospectus, product disclosure statement or other disclosure document under the Corporations Act.

Any offer in Australia of the shares may only be made to persons (the Exempt Investors) who are "sophisticated investors" (within the meaning of section 708(8) of the Corporations Act), "professional investors" (within the meaning of section 708(11) of the Corporations Act) or otherwise pursuant to one

or more exemptions contained in section 708 of the Corporations Act so that it is lawful to offer the shares without disclosure to investors under Chapter 6D of the Corporations Act.

The shares applied for by Exempt Investors in Australia must not be offered for sale in Australia in the period of 12 months after the date of allotment under the offering, except in circumstances where disclosure to investors under Chapter 6D of the Corporations Act would not be required pursuant to an exemption under section 708 of the Corporations Act or otherwise or where the offer is pursuant to a disclosure document which complies with Chapter 6D of the Corporations Act. Any person acquiring shares must observe such Australian on-sale restrictions.

This offering document contains general information only and does not take account of the investment objectives, financial situation or particular needs of any particular person. It does not contain any securities recommendations or financial product advice. Before making an investment decision, investors need to consider whether the information in this offering document is appropriate to their needs, objectives and circumstances, and, if necessary, seek expert advice on those matters.

Dubai International Financial Centre

This offering document relates to an Exempt Offer in accordance with the Offered Securities Rules of the Dubai Financial Services Authority (DFSA). This offering document is intended for distribution only to persons of a type specified in the Offered Securities Rules of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus nor taken steps to verify the information set forth in this prospectus and has no responsibility for the offering document. The shares to which this offering document relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the shares offered should conduct their own due diligence on the shares. If you do not understand the contents of this offering document you should consult an authorized financial advisor.

Switzerland

We have not and will not register with the Swiss Financial Market Supervisory Authority (FINMA) as a foreign collective investment scheme pursuant to Article 119 of the Federal Act on Collective Investment Scheme of 23 June 2006, as amended (CISA), and accordingly the shares being offered pursuant to this prospectus have not and will not be approved, and may not be licenseable, with FINMA. Therefore, the shares have not been authorized for distribution by FINMA as a foreign collective investment scheme pursuant to Article 119 CISA and the shares offered hereby may not be offered to the public (as this term is defined in Article 3 CISA) in or from Switzerland. The shares may solely be offered to "qualified investors," as this term is defined in Article 10 CISA, and in the circumstances set out in Article 3 of the Ordinance on Collective Investment Scheme of 22 November 2006, as amended (CISO), such that there is no public offer. Investors, however, do not benefit from protection under CISA or CISO or supervision by FINMA. This prospectus and any other materials relating to the shares are strictly personal and confidential to each offeree and do not constitute an offer to any other person. This prospectus may only be used by those qualified investors to whom it has been handed out in connection with the offer described in this prospectus and may neither directly or indirectly be distributed or made available to any person or entity other than its recipients. It may not be used in connection with any other offer and shall in particular not be copied and/or distributed to the public in Switzerland or from Switzerland. This prospectus does not constitute an issue prospectus as that term is understood pursuant to Article 652a and/or 1156 of the Swiss Federal Code of Obligations. We have not applied for a listing of the shares on the SIX Swiss Exchange or any other regulated securities market in Switzerland, and consequently, the information presented in this prospectus does not necessarily comply with the information standards set out in the listing rules of the SIX Swiss Exchange and corresponding prospectus schemes annexed to the listing rules of the SIX Swiss Exchange.

LEGAL MATTERS

The validity of the issuance of our common stock offered in this prospectus will be passed upon for us by Latham & Watkins LLP, Menlo Park, California. Cooley LLP, San Francisco, California, is acting as counsel for the underwriters in connection with this offering.

EXPERTS

The financial statements as of December 31, 2018 and December 31, 2019 and for the years then ended included in this Prospectus have been so included in reliance on the report (which contains an explanatory paragraph relating to the Company's ability to continue as a going concern as described in Note 1 to the financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act with respect to the shares of our common stock offered hereby. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement or the exhibits and schedules filed therewith. For further information with respect to 4D Molecular Therapeutics, Inc. and the common stock offered hereby, reference is made to the registration statement and the exhibits and schedules filed therewith. Statements contained in this prospectus regarding the contents of any contract or any other document that is filed as an exhibit to the registration statement are not necessarily complete, and each such statement is qualified in all respects by reference to the full text of such contract or other document filed as an exhibit to the registration statement. The SEC maintains a website that contains reports, proxy and information statements and other information regarding registrants that file electronically with the SEC. The address is www.sec.gov.

Upon completion of this offering, we will become subject to the information and periodic reporting requirements of the Exchange Act and, in accordance therewith, will file periodic reports, proxy statements and other information with the SEC. Such periodic reports, proxy statements and other information will be available for inspection and copying at the public reference room and website of the SEC referred to above. We maintain a website at www.4dmoleculartherapeutics.com. Upon completion of this offering, you may access our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the SEC free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. The reference to our website address does not constitute incorporation by reference of the information contained on our website, and you should not consider the contents of our website in making an investment decision with respect to our common stock.

4D Molecular Therapeutics, Inc.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of 4D Molecular Therapeutics, Inc.

Opinion on the Financial Statements

We have audited the accompanying balance sheets of 4D Molecular Therapeutics, Inc. (the "Company") as of December 31, 2019 and 2018, and the related statements of operations and comprehensive loss, of redeemable convertible preferred stock and stockholders' deficit and of cash flows for the years then ended, including the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Substantial Doubt about the Company's Ability to Continue as a Going Concern

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the financial statements, the Company has recurring losses and negative cash flows from operations that raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits of these financial statements in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers LLP

San Jose, California

June 19, 2020, except for (i) the effects of disclosing net loss per share information, (ii) the segment information, and (iii) the matters that raise substantial doubt about the Company's ability to continue as a going concern discussed in Notes 14, 2, and 1, respectively, to the financial statements, as to which the date is October 14, 2020

We have served as the Company's auditor since 2016.

4D Molecular Therapeutics, Inc.
Balance Sheets
(In thousands, except share and per share amounts)

	As of December 31,		As of September 30, 2020	Pro Forma As of September 30, 2020
	2018	2019	(Unaudited)	(Unaudited)
Assets				
Current assets:				
Cash and cash equivalents	\$ 91,761	\$ 49,652	\$ 88,755	\$ 88,755
Accounts receivable	1,124	978	896	896
Prepaid expenses and other current assets (includes \$0, \$149 and \$295 (unaudited), at December 31, 2018, December 31, 2019 and September 30, 2020, respectively, attributable to related parties)	<u>1,183</u>	<u>1,878</u>	<u>2,885</u>	<u>2,885</u>
Total current assets	94,068	52,508	92,536	92,536
Property and equipment, net	2,472	5,049	4,981	4,981
Other assets	429	677	675	675
Total assets	<u>\$ 96,969</u>	<u>\$ 58,234</u>	<u>\$ 98,192</u>	<u>\$ 98,192</u>
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' (Deficit) Equity				
Current liabilities				
Accounts payable	\$ 954	\$ 1,744	\$ 1,292	\$ 1,292
Accrued and other current liabilities	2,193	5,347	7,367	7,367
Deferred revenue (includes \$0, \$1,122 and \$0 (unaudited), at December 31, 2018, December 31, 2019 and September 30, 2020, respectively, attributable to related parties)	<u>4,907</u>	<u>5,864</u>	<u>5,619</u>	<u>5,619</u>
Total current liabilities	8,054	12,955	14,278	14,278
Deferred revenue, net of current portion (includes \$0, \$4,015 and \$0 (unaudited), at December 31, 2018, December 31, 2019 and September 30, 2020, respectively, attributable to related parties)	13,076	13,603	11,731	11,731
Derivative liability	64	101	117	117
Other liabilities	<u>382</u>	<u>1,565</u>	<u>1,910</u>	<u>1,910</u>
Total liabilities	<u>21,576</u>	<u>28,224</u>	<u>28,036</u>	<u>28,036</u>
Commitments and contingencies (Note 8)				
Redeemable convertible preferred stock, \$0.0001 par value; 7,375,638 shares authorized and 7,375,631 shares issued and outstanding at December 31, 2018 and December 31, 2019. 11,575,984 (unaudited) shares authorized, issued and outstanding at September 30, 2020. Liquidation value of \$108,596 at December 31, 2018 and December 31, 2019 and \$184,202 (unaudited) at September 30, 2020. No shares authorized, issued or outstanding, pro forma (unaudited)	<u>102,980</u>	<u>102,980</u>	<u>175,448</u>	<u>—</u>
Stockholders' (deficit) equity				
Common stock, \$0.0001 par value; 50,000,000 shares authorized at December 31, 2018 and December 31, 2019 and 20,866,244 (unaudited) shares authorized at September 30, 2020; 5,126,344, 5,178,955 and 5,257,742 (unaudited) shares issued and outstanding at December 31, 2018, December 31, 2019 and September 30, 2020, respectively; 16,833,726 shares issued and outstanding, pro forma (unaudited)	1	1	1	2
Additional paid-in-capital	2,438	6,054	9,839	185,286
Accumulated deficit	<u>(30,026)</u>	<u>(79,025)</u>	<u>(115,132)</u>	<u>(115,132)</u>
Total stockholders' (deficit) equity	<u>(27,587)</u>	<u>(72,970)</u>	<u>(105,292)</u>	<u>70,156</u>
Total liabilities, redeemable convertible preferred stock and stockholders' (deficit) equity	<u>\$ 96,969</u>	<u>\$ 58,234</u>	<u>\$ 98,192</u>	<u>\$ 98,192</u>

The accompanying notes are an integral part of these financial statements

4D Molecular Therapeutics, Inc.
Statements of Operations and Comprehensive Loss
(In thousands, except share and per share amounts)

	Year Ended December 31,		Nine Months Ended	
	2018	2019	September 30, 2019 (Unaudited)	2020 (Unaudited)
Revenue:				
Collaboration and license revenue	\$ 8,987	\$ 6,960	\$ 4,930	\$ 14,340
Collaboration and license revenue, related parties	5,143	26	26	249
Total revenue	14,130	6,986	4,956	14,589
Operating expenses:				
Research and development (includes \$160 and \$350 for the years ended December 31, 2018 and 2019 and \$224 (unaudited) and \$397 (unaudited) for the nine months ended September 30, 2019 and 2020, respectively, attributable to related parties)	18,362	38,718	26,359	40,433
Acquired in-process research and development (includes \$0 and \$5,137 for the years ended December 31, 2018 and 2019 and \$5,137 (unaudited) and \$0 (unaudited) for the nine months ended September 30, 2019 and 2020, respectively, attributable to related parties)	—	5,137	5,137	—
General and administrative (includes \$220 and \$0 for the years ended December 31, 2018 and 2019 and \$0 (unaudited) for each of the nine months ended September 30, 2019 and 2020, respectively, attributable to related parties)	6,167	13,895	7,936	10,398
Total operating expenses	24,529	57,750	39,432	50,831
Loss from operations	(10,399)	(50,764)	(34,476)	(36,242)
Other income (expense):				
Interest income	850	1,504	1,286	148
Other income (expense), net	(2)	(46)	(1)	(52)
Total other income (expense)	848	1,458	1,285	96
Net loss and comprehensive loss	\$ (9,551)	\$ (49,306)	\$ (33,191)	\$ (36,146)
Net loss per share attributable to common stockholders, basic and diluted	\$ (1.89)	\$ (9.59)	\$ (6.46)	\$ (6.97)
Weighted-average shares outstanding used in computing net loss per share attributable to common stockholders, basic and diluted	5,049,203	5,142,560	5,135,622	5,188,628
Pro forma net loss per share, basic and diluted (unaudited)		\$ (3.94)		\$ (2.44)
Weighted-average shares outstanding used in computing pro forma net loss per share, basic and diluted (unaudited)		12,518,191		14,835,343

The accompanying notes are an integral part of these financial statements

4D Molecular Therapeutics, Inc.
Statements of Redeemable Convertible Preferred Stock and Stockholders' Deficit
(In thousands, except share amounts)

	Redeemable Convertible Preferred Stock		Common Stock		Additional Paid-In Capital	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount			
Balances at December 31, 2017	2,220,999	\$ 18,508	5,063,303	\$ 1	\$ 884	\$ (20,475)	\$ (19,590)
Issuance of redeemable convertible preferred stock, net of \$5,528 of issuance cost	5,154,632	84,472	—	—	—	—	—
Exercise of common stock options	—	—	63,041	—	105	—	105
Issuance of common stock warrants	—	—	—	—	72	—	72
Stock-based compensation	—	—	—	—	1,377	—	1,377
Net loss	—	—	—	—	—	(9,551)	(9,551)
Balances at December 31, 2018	7,375,631	\$102,980	5,126,344	\$ 1	\$ 2,438	\$ (30,026)	\$ (27,587)
Cumulative effect of adoption of ASC 606	—	—	—	—	—	307	307
Exercise of common stock options	—	—	52,611	—	75	—	75
Stock-based compensation	—	—	—	—	3,541	—	3,541
Net loss	—	—	—	—	—	(49,306)	(49,306)
Balances at December 31, 2019	<u>7,375,631</u>	<u>\$102,980</u>	<u>5,178,955</u>	<u>\$ 1</u>	<u>\$ 6,054</u>	<u>\$ (79,025)</u>	<u>\$ (72,970)</u>

The accompanying notes are an integral part of these financial statements.

4D Molecular Therapeutics, Inc.
Statements of Redeemable Convertible Preferred Stock and Stockholders' Deficit – (Continued)
(In thousands, except share amounts)

	Redeemable Convertible Preferred Stock		Common Stock		Additional Paid-In Capital	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount			
Balances at December 31, 2018	7,375,631	\$102,980	5,126,344	\$ 1	\$ 2,438	\$ (30,026)	\$ (27,587)
Cumulative effect of adoption of ASC 606 (unaudited)	—	—	—	—	—	307	307
Exercise of common stock options (unaudited)	—	—	15,000	—	20	—	20
Stock-based compensation (unaudited)	—	—	—	—	2,526	—	2,526
Net loss (unaudited)	—	—	—	—	—	(33,191)	(33,191)
Balances at September 30, 2019 (unaudited)	<u>7,375,631</u>	<u>\$102,980</u>	<u>5,141,344</u>	<u>\$ 1</u>	<u>\$ 4,984</u>	<u>\$ (62,910)</u>	<u>\$ (57,925)</u>
Balances at December 31, 2019	7,375,631	\$102,980	5,178,955	\$ 1	\$ 6,054	\$ (79,025)	\$ (72,970)
Issuance of redeemable convertible preferred stock, net of \$3,138 of issuance cost (unaudited)	4,200,353	\$ 72,468	—	—	—	—	—
Cumulative effect of adoption of ASU 2018-07 (unaudited)	—	—	—	—	(39)	39	—
Exercise of common stock options (unaudited)	—	—	78,787	—	557	—	557
Stock-based compensation (unaudited)	—	—	—	—	3,267	—	3,267
Net loss (unaudited)	—	—	—	—	—	(36,146)	(36,146)
Balances at September 30, 2020 (unaudited)	<u>11,575,984</u>	<u>\$175,448</u>	<u>5,257,742</u>	<u>\$ 1</u>	<u>\$ 9,839</u>	<u>\$ (115,132)</u>	<u>\$ (105,292)</u>

The accompanying notes are an integral part of these financial statements

4D Molecular Therapeutics, Inc.
Statements of Cash Flows
(In thousands)

	Year Ended December 31,		Nine Months Ended September 30,	
	2018	2019	2019	2020
Cash flows from operating activities			(Unaudited)	
Net loss	\$ (9,551)	\$(49,306)	\$(33,191)	\$(36,146)
Adjustments to reconcile net loss to net cash used in operating activities				
Stock-based compensation expense	1,377	3,541	2,526	3,267
Change in fair value of derivative liability	(14)	37	(1)	16
Depreciation and amortization	697	1,004	686	1,072
Loss on disposition of property and equipment	16	7	—	—
Write-off of public offering costs	—	2,610	—	—
In-process research and development acquired and expensed in non-monetary related party transaction	—	5,137	5,137	—
Changes in operating assets and liabilities				
Accounts receivable	(803)	146	226	82
Prepaid expenses and other current assets	(855)	(695)	(2,140)	(1,007)
Other assets	(324)	(220)	(309)	75
Accounts payable	438	533	(175)	(524)
Accrued and other liabilities	1,354	3,841	1,511	1,872
Deferred revenue	(8,587)	(3,346)	(2,295)	(2,117)
Net cash used in operating activities	<u>(16,252)</u>	<u>(36,711)</u>	<u>(28,025)</u>	<u>(33,410)</u>
Cash flows from investing activities				
Acquisition of property and equipment	(414)	(3,203)	(2,726)	(492)
Net cash used in investing activities	<u>(414)</u>	<u>(3,203)</u>	<u>(2,726)</u>	<u>(492)</u>
Cash flows from financing activities				
Issuance of redeemable convertible preferred stock, net of issuance costs	84,472	—	—	72,468
Issuance of common stock	105	75	20	557
Payments of public offering costs	—	(2,260)	(1,545)	(20)
Payments of private offering costs	—	(10)	—	—
Net cash provided by (used in) financing activities	<u>84,577</u>	<u>(2,195)</u>	<u>(1,525)</u>	<u>73,005</u>
Net increase (decrease) in cash and cash equivalents	<u>67,911</u>	<u>(42,109)</u>	<u>(32,276)</u>	<u>39,103</u>
Cash and cash equivalents, beginning of period	<u>23,850</u>	<u>91,761</u>	<u>91,761</u>	<u>49,652</u>
Cash and cash equivalents, end of period	<u>\$ 91,761</u>	<u>\$ 49,652</u>	<u>\$ 59,485</u>	<u>\$ 88,755</u>
Supplemental disclosures of non-cash investing and financing information				
Purchases of property and equipment in accounts payable and accrued and other liabilities	\$ 56	\$ 385	\$ 396	\$ 512
Unpaid public offering costs	\$ —	\$ 350	\$ 867	\$ 53
Unpaid private offering costs	\$ —	\$ 18	\$ —	\$ —
Issuance of common stock warrants in return for services	\$ 72	\$ —	\$ —	\$ —

The accompanying notes are an integral part of these financial statements.

4D Molecular Therapeutics, Inc.

Notes to Financial Statements

1. Organization and Nature of the Business

Organization and Business

4D Molecular Therapeutics, Inc. (the "Company") was formed as a limited liability company in September 2013 under the name 4D Molecular Therapeutics, LLC. The Company changed its name and converted into a corporation which was incorporated in the state of Delaware in March 2015. The Company is a clinical-stage gene therapy company pioneering the development of product candidates using its targeted and evolved adeno-associated viruses ("AAV") vectors.

Liquidity and Going Concern

The Company experienced negative operating cash flows of \$16.3 million and \$36.7 million for the years ended December 31, 2018 and 2019, respectively, and \$33.4 million (unaudited) for the nine months ended September 30, 2020. The Company had an accumulated deficit of \$30.0 million and \$79.0 million as of December 31, 2018 and 2019, respectively, and \$115.1 million (unaudited) as of September 30, 2020. Since its inception, the Company has funded its operations primarily with proceeds from sales of redeemable convertible preferred stock and to a lesser extent from cash received pursuant to its collaboration and licensing arrangements. As of December 31, 2019 and September 30, 2020, the Company had \$49.7 million and \$88.8 million (unaudited) in cash and cash equivalents, respectively. In April and June of 2020, the Company received a total of \$75.6 million gross proceeds (net proceeds of \$72.5 million) from its issuance of Series C redeemable convertible preferred stock. See Note 10 for further discussion on the Series C Preferred Stock Purchase Agreement.

The Company is seeking to complete an initial public offering of its common stock. In the event the Company does not complete an initial public offering, the Company expects to seek additional funding through private equity financings, debt financings, or other capital sources, including collaborations with other companies or other strategic transactions. There is no assurance that the Company will be successful in obtaining funding on terms acceptable to the Company to fund continuing operations, if at all. The terms of any financing may adversely affect the holdings or the rights of the Company's stockholders.

If the Company is unable to obtain additional funding, the Company expects to delay, reduce or eliminate some or all of its research and development programs, product portfolio expansion or investment in internal manufacturing capabilities, which could adversely affect its business prospects. If the Company raises additional funds through collaborations or marketing, distribution or licensing arrangements with third parties, it may have to relinquish valuable rights to future revenue streams or product candidates or grant licenses on terms that may not be favorable to it.

Based on its recurring losses and negative cash flows from operations, expectation of continuing operating losses and negative cash flows from operations for the foreseeable future, and the need to raise additional capital to finance its future operations, management concluded that there is substantial doubt about the Company's ability to continue as a going concern within one year after the date that the annual and unaudited interim financial statements were available for reissuance and issuance, respectively.

The accompanying financial statements do not include any adjustments that might result from the outcome of this uncertainty. Accordingly, the financial statements have been prepared on a basis that assumes the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the ordinary course of business.

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying financial statements have been prepared in accordance with United States Generally Accepted Accounting Principles ("U.S. GAAP").

Unaudited Interim Financial Information

The accompanying balance sheet as of September 30, 2020, the statements of operations and comprehensive loss, of redeemable convertible preferred stock and stockholders' deficit and of cash flows for the nine months ended September 30, 2019 and 2020 are unaudited. In the opinion of management, the unaudited data reflects all adjustments, which include only normal recurring adjustments, necessary for the fair statement of the Company's financial position as of September 30, 2020 and the results of its operations and comprehensive loss and its cash flows for the nine months ended September 30, 2019 and 2020. The financial data and other information disclosed in these notes related to the nine months ended September 30, 2019 and 2020 are also unaudited. The results for the nine months ended September 30, 2020 are not necessarily indicative of results to be expected for the year ending December 31, 2020, any other interim periods, or any future year or period.

Unaudited Pro Forma Information

The unaudited pro forma basic and diluted net loss per share were computed to give effect to the automatic conversion of all outstanding shares of redeemable convertible preferred stock on a one-for-one basis into shares of common stock immediately prior to the completion of a qualified initial public offering ("IPO") (see Note 10 for further discussion of the conversion of redeemable convertible preferred stock) as though the conversion had occurred as of the beginning of the period or the date of issuance, if later.

The unaudited pro forma redeemable convertible preferred stock and stockholders' deficit were computed to give effect to the automatic conversion of all outstanding shares of redeemable convertible preferred stock on a one-for-one basis into shares of common stock immediately prior to the completion of a qualified IPO. The unaudited pro forma information does not assume any proceeds from the planned IPO.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue and expenses; and disclosure of contingent assets and liabilities as of the date of the financial statements. Such estimates include the determination of useful lives for property and equipment, the contract term, transaction price and costs of collaboration agreements, as well as estimates of the fair value of common stock, stock options and derivative instruments and income tax uncertainties. Actual results could differ from those estimates.

Due to the coronavirus ("COVID-19") pandemic, there has been uncertainty and disruption in the global economy and financial markets. The Company is not aware of any specific event or circumstance that would require an update to its estimates or judgments or a revision of the carrying value of its assets or liabilities as of December 31, 2019 and September 30, 2020 (unaudited). While there was not a material impact to the Company's financial statements as of December 31, 2019 and September 30, 2020 (unaudited) and for the year ended December 31, 2019 and the nine months ended September 30, 2020 (unaudited), these estimates may change, as new events occur and additional information is obtained, as well as other factors related to the COVID-19 pandemic that could result in material impacts to the financial statements in future reporting periods.

Segment Information

The Company operates and manages its business as one reportable and operating segment. The Company's chief executive officer, who is the chief operating decision maker, reviews financial information on a consolidated basis for purposes of allocating resources and assessing financial performance.

As of and for the years ended December 31, 2018 and December 31, 2019 and as of and for the nine months ended September 30, 2020 (unaudited), all of the Company's long-lived assets were located in the United States and all revenue was earned in the United States.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to a concentration of credit risk consist of cash and cash equivalents and accounts receivable. The Company's cash is held at two financial institutions in the United States of America. The Company's cash equivalents are invested in money market funds. The Company has not experienced any losses on its deposits of cash and cash equivalents. Such deposits may, at times, exceed federally insured limits.

The Company's partners in collaboration and license agreements who represent 10% or more of the Company's total revenue are as follows:

	Year Ended December 31, 2018	Year Ended December 31, 2019	Nine Months Ended September 30, 2019 (Unaudited)	Nine Months Ended September 30, 2020 (Unaudited)
Customer A	53%	90%	88%	97%
Customer B	35%	*	*	*
Customer C	*	*	*	*
Customer D	*	*	11%	*
Total	<u>88%</u>	<u>90%</u>	<u>99%</u>	<u>97%</u>

* Less than 10%

The Company's partners in collaboration and license agreements who represent 10% or more of the Company's total accounts receivable are as follows:

	December 31, 2018	December 31, 2019	September 30, 2020 (Unaudited)
Customer A	100%	64%	100%
Customer B	—	—	—
Customer C	—	36%	—
Customer D	—	—	—
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>

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The Company's total revenues by geographic region, based on the location of the customer, are as follows (in thousands):

	Year Ended December 31, 2018	Year Ended December 31, 2019	Nine Months Ended September 30, 2019 (Unaudited)	Nine Months Ended September 30, 2020 (Unaudited)
Australia	\$ 200	\$ 7	\$ 7	\$ —
Netherlands	143	26	26	504
Switzerland	7,460	6,287	4,354	14,174
United States	6,327	666	569	(89)
	<u>\$ 14,130</u>	<u>\$ 6,986</u>	<u>\$ 4,956</u>	<u>\$ 14,589</u>

Cash and Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less at the date of purchase to be cash equivalents. Cash equivalents consist of money market funds.

Other Risks and Uncertainties

The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, protection of proprietary technology, dependence on key personnel, suppliers for key raw materials, contract manufacturing organizations ("CMOs") and contract research organizations ("CROs"), compliance with government regulations and the need to obtain additional financing to fund operations. Product candidates currently under development will require significant additional research and development efforts, including extensive preclinical studies and clinical trials and regulatory approval, prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel infrastructure and extensive compliance and reporting.

There can be no assurance that the Company's research and development will be successfully completed, that adequate protection for the Company's intellectual property will be obtained or maintained, that any products developed will obtain necessary government regulatory approval or that any approved products will be commercially viable. Even if the Company's product development efforts are successful, it is uncertain when, if ever, the Company will generate significant revenue from product sales. The Company operates in an environment of rapid change in technology and substantial competition from other pharmaceutical and biotechnology companies. In addition, the Company is dependent upon the services of its employees, consultants and other third parties (including for clinical trials and some aspects of research and preclinical testing).

The extent of the impact of the COVID-19 pandemic on the Company's business will depend upon the duration and spread of the outbreak and the extent and severity of the impact on the Company's clinical trial activities, research activities and suppliers, all of which are uncertain and cannot be predicted. The extent to which the coronavirus outbreak may materially impact the Company's financial condition, liquidity or results of operations is uncertain.

Fair Value Measurements

The Company applies fair value accounting for all financial assets and liabilities and non-financial assets and liabilities that are recognized or disclosed at fair value in the financial statements on a recurring basis. Fair value is an exit price, representing the amount that would be received to sell an

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asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability.

As a basis for considering such assumptions, a three-level fair value hierarchy has been established, which prioritizes the inputs used in measuring fair value as follows:

- *Level 1*—Observable inputs, such as quoted prices in active markets for identical assets and liabilities.
- *Level 2*—Observable inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- *Level 3*—Unobservable inputs that are significant to the measurement of the fair value of the assets or liabilities that are supported by little or no market data.

The Company accounts for transfers of financial instruments between levels of the fair value hierarchy on the date of the event or change in circumstance that caused the transfer.

Accounts Receivable—Allowance for Doubtful Accounts

The Company regularly reviews accounts receivable for collectability and establishes an allowance for probable credit losses and writes off uncollectible accounts as necessary. The Company has determined that no allowance was required at December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited). The Company did not have any write-offs relating to uncollectible accounts receivable during the years ended December 31, 2018 and 2019 and nine months ended September 30, 2019 and 2020 (unaudited).

Property and Equipment, net

Property and equipment are stated at cost less accumulated depreciation for acquired assets. Depreciation is computed using the straight-line method over the estimated useful lives of assets, ranging from three to five years. Leasehold improvements are amortized over the shorter of the useful life of the assets or the length of the lease. Upon sale or retirement of assets, the costs and related accumulated depreciation are removed from the balance sheet and the resulting gain or loss is reflected within operating expenses in the statements of operations and comprehensive loss. Maintenance and repairs are charged to expense as incurred.

Impairment of Long-Lived Assets

The Company reviews long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability is measured by comparison of the carrying amount to the future undiscounted net cash flows, which the assets are expected to generate. If such assets are considered to be impaired, the impairment to be recognized is typically measured by the amount by which the carrying amount of the assets exceeds the projected discounted future net cash flows arising from the asset. There have been no such impairments of long-lived assets in the years ended December 31, 2018 and 2019 and nine months ended September 30, 2019 and 2020 (unaudited).

Redeemable Convertible Preferred Stock

The Company records all shares of redeemable convertible preferred stock at their respective fair values on the dates of issuance, net of issuance costs. The redeemable convertible preferred stock is recorded outside of permanent equity because while it is not mandatorily redeemable, in certain events

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considered not solely within the Company's control, such as a merger or consolidation, sale, lease, or license of substantially all of the Company's assets (each, a "deemed liquidation event"), the convertible preferred stock will become redeemable at the option of the holders of a majority of the outstanding series of redeemable convertible preferred stock. The Company has not adjusted the carrying values of the redeemable convertible preferred stock to the liquidation preference of such shares because a deemed liquidation event obligating the Company to pay the liquidation preference is not considered probable. Subsequent adjustments to the carrying values to the liquidation preference will be made only when it becomes probable that such a deemed liquidation event will occur.

Common Stock Warrants

The Company accounts for common stock warrants which meet the definition of a derivative as liabilities if the warrant requires net cash settlement or gives the holder the option of net cash settlement. The Company accounts for common stock warrants as equity if the contract requires physical settlement or net physical settlement or if the Company has the option of physical settlement or net physical settlement. Common stock warrants classified as liabilities are initially recorded at fair value and remeasured at fair value each balance sheet date with the offset adjustments recorded in other income (expense), net within the statements of operations and comprehensive loss. Common stock warrants classified as equity are initially measured at fair value on the grant date and are not subsequently remeasured.

Revenue Recognition

Effective January 1, 2019, the Company adopted Accounting Standards Update ("ASU") 2014-09, *Revenue from Contracts with Customers (Topic 606)* ("ASC 606"), using the modified retrospective transition method. The Company determines revenue recognition for arrangements within the scope of ASC 606 by performing the following five steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when (or as) the Company satisfies each performance obligation.

The Company's revenue is primarily derived through its license, research, development and commercialization agreements. The terms of these types of agreements may include (i) licenses to the Company's technology, (ii) research and development services, and (iii) services or obligations in connection with participation in research or steering committees. Payments to the Company under these arrangements typically include one or more of the following: nonrefundable upfront and license fees, research funding, milestone and other contingent payments to the Company for the achievement of defined collaboration objectives and certain preclinical, clinical, regulatory and sales-based events, as well as royalties on sales of any commercialized products. Arrangements that include upfront payments are recorded as deferred revenue upon receipt or when due and are recognized as revenue as performance conditions are met. The event-based milestone payments, royalties and cost reimbursements represent variable consideration, and the Company uses the most likely amount method to estimate this variable consideration. Royalty payments are recognized when earned or as the sales occur. The Company records cost reimbursements as accounts receivable when right to consideration is unconditional.

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account in ASC 606. The Company allocates the total transaction price to each performance obligation based on the estimated standalone selling price and recognizes revenue when, or as, the performance obligation is satisfied. The Company includes the unconstrained amount of estimated variable consideration in the transaction price. At the end of each reporting period, the

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Company re-evaluates the estimated variable consideration included in the transaction price and any related constraint, and if necessary, adjusts its estimate of the overall transaction price.

Prior to the adoption of ASC 606 on January 1, 2019, the Company recognized revenue when all of the following criteria were met: persuasive evidence of an arrangement exists; transfer of technology has been completed or services have been rendered; the price to the customer is fixed or determinable; and collectability is reasonably assured.

In arrangements involving the delivery of more than one element, each required deliverable was evaluated to determine whether it qualified as a separate unit of accounting. The determination was based on whether the deliverable had "standalone value" to the customer. If a deliverable did not qualify as a separate unit of accounting, it was combined with the other applicable undelivered item(s) within the arrangement and these combined deliverables were treated as a single unit of accounting.

The arrangement's consideration that was fixed or determinable was allocated to each separate unit of accounting based on the relative selling price methodology in accordance with the selling price hierarchy, which included vendor-specific objective evidence ("VSOE") of selling price, if available, or third-party evidence of selling price if VSOE was not available, or the best estimate of selling price, if neither VSOE nor third-party evidence was available.

Payments or reimbursements for the Company's research and development efforts for the arrangements where such efforts were considered as deliverables were recognized as the services were performed and were presented on a gross basis. When upfront payments were received and if there was no discernible pattern of performance, the Company recognized revenue ratably over the associated period of performance.

Research and Development Expenses

Costs related to research, design and development of programs are charged to research and development expense as incurred. Research and development costs include, but are not limited to, payroll and personnel expenses including stock-based compensation, materials, laboratory supplies, outside services and allocated overhead, including rent, insurance, repairs and maintenance, depreciation and utilities. The Company expenses all research and development costs in the period in which they are incurred.

Costs incurred in obtaining technology licenses are charged to research and development expense as acquired in-process research and development if the technology licensed has not reached technological feasibility and has no alternative future use.

Accrued Research and Development

The Company has entered into various agreements with CROs and CMOs. The Company's research and development accruals are estimated based on the level of services performed, progress of the studies, including the phase or completion of events, and contracted costs. The estimated costs of research and development provided, but not yet invoiced, are included in accrued and other current liabilities on the balance sheet. If the actual timing of the performance of services or the level of effort varies from the original estimates, the Company will adjust the accrual accordingly. Payments made to CROs or CMOs under these arrangements in advance of the performance of the related services are recorded as prepaid expenses and other current assets until the services are rendered.

Stock-Based Compensation

As of December 31, 2019, the Company accounts for stock-based compensation as measured at grant date, based on the fair value of the award. The Company measures the fair value of awards

granted using the Black-Scholes option pricing model and recognizes the expense in the Company's statements of operations and comprehensive loss over the requisite service period using the straight-line method. Forfeitures are accounted for as they occur. The Company's policy for issuing stock upon stock option exercise is to issue new common stock.

The Company recognizes the fair value of stock options granted to nonemployees as stock-based compensation expense over the period in which the related services are received. Stock-based compensation expense related to stock options granted to nonemployees is recognized based on the vesting date fair value of awards as the stock options are earned. The Company remeasures the stock-based compensation at each reporting period end with the resulting change in fair value being recognized in the statements of operations and comprehensive loss over the period the related services are rendered. The Company believes that the estimated fair value of stock options is more readily measurable than the fair value of the services rendered. In addition, the Company estimates the service period for the awards based on the time that would be required to satisfy the service condition, assuming the service condition will be satisfied. Stock-based compensation expense is recognized over the estimated service period but is accelerated if the performance condition is achieved earlier than estimated.

Stock-Based Compensation (unaudited)

On January 1, 2020, the Company adopted ASU 2018-07, *Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting*, which aligns the measurement and classification guidance for share-based payments to nonemployees with the guidance for share-based payments to employees. As of January 1, 2020, the Company accounts for stock-based compensation for stock options granted to employees, directors and nonemployees as measured at grant date, based on the fair value of the award. The Company measures the fair value of awards granted using the Black-Scholes option pricing model and recognizes the expense in the Company's statements of operations and comprehensive loss over the requisite service period using the straight-line method.

Income Taxes

The Company accounts for income taxes under the asset and liability method, which requires, among other things, that deferred income taxes be provided for temporary differences between the tax basis of the Company's assets and liabilities and their financial statement reported amounts. In addition, deferred tax assets are recorded for the future benefit of utilizing net operating losses and research and development credit carryforwards and are measured using the enacted tax rates and laws that will be in effect when such items are expected to reverse. A valuation allowance is provided against deferred tax assets unless it is more likely than not that they will be realized.

The Company accounts for uncertain tax positions by assessing all material positions taken in any assessment or challenge by relevant taxing authorities. Assessing an uncertain tax position begins with the initial determination of the position's sustainability and is measured at the largest amount of benefit that is greater than fifty percent likely of being realized upon ultimate settlement. The Company's policy is to recognize interest and penalties related to the underpayment of income taxes as a component of income tax expense or benefit. To date, there have been no interest or penalties charged in relation to the unrecognized tax benefits.

Embedded Derivative

Embedded derivatives that are required to be bifurcated from the underlying host instrument are accounted for and valued as a separate financial instrument. An embedded derivative exists in the

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award agreement with the Cystic Fibrosis Foundation Therapeutics, Inc. ("CFFT"). As described in Note 15, the embedded derivative has been bifurcated and is classified as a liability on the balance sheet and separately accounted for at its fair value. The derivative liability is subject to remeasurement to fair value each reporting period. Changes in the fair value of the derivative liability are recognized as a component of other income (expense), net within the statements of operations and comprehensive loss.

Deferred Offering Costs

The Company capitalizes certain legal, accounting and other third-party fees that are directly related to the Company's in-process equity financings, including the planned IPO, until such financings are consummated. After consummation of the equity financing, these costs are recorded as a reduction of the proceeds received as a result of the offering. In the event that a planned offering does not occur or is significantly delayed, all related deferred offering costs will be expensed immediately within the Company's statements of operations and comprehensive loss. The Company incurred \$2.6 million of public offering costs for the year ended December 31, 2019, which were expensed to general and administrative expenses, as a result of delays in the IPO process during the period. There were no material deferred offering costs capitalized as of December 31, 2018 or 2019. As of September 30, 2020, \$0.1 million (unaudited) deferred offering costs were recorded on the balance sheet.

Net Loss Per Share Attributable to Common Stockholders

The Company calculates basic and diluted net loss per share to common stockholders in conformity with the two-class method required for companies with participating securities. The Company considers all series of redeemable convertible preferred stock to be participating securities as the holders are entitled to receive non-cumulative dividends on a pari passu basis in the event the dividend is paid on common shares. Under the two-class method, the net loss attributable to common stockholders is not allocated to the redeemable convertible preferred stock as the holders of redeemable convertible preferred stock do not have a contractual obligation to share in losses.

Basic net loss per share attributable to common stockholders is calculated by dividing the net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period, less shares subject to repurchase. Diluted net loss per share attributable to common stockholders is computed by giving effect to all potentially dilutive common shares outstanding for the period. For purposes of this calculation, redeemable convertible preferred shares, stock options to acquire shares of common stock, common stock warrants, and unvested common stock subject to repurchase, are considered potentially dilutive common shares, but have been excluded from the calculation of diluted net loss per share attributable to common stockholders as their effect is antidilutive.

Recent Accounting Pronouncements

Recently Adopted Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board ("FASB") issued ASC 606. This standard outlines a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most current revenue recognition guidance, including industry-specific guidance. Under ASC 606, an entity recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services.

The Company adopted ASC 606 effective January 1, 2019 using the modified retrospective method only to contracts not completed as of this date. The Company recognized the cumulative effect

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of initially applying ASC 606 as an adjustment to the balance of accumulated deficit at January 1, 2019 with a cumulative effect adjustment of \$0.3 million reflected as a decrease to the opening balance of accumulated deficit and a decrease to deferred revenue. See Note 6 for further discussion on research and collaboration arrangements.

The following tables summarize the amount by which each financial statement line item was affected by the impact of the cumulative adjustment and as compared with the guidance that was in effect prior to the adoption (in thousands):

**Impact of ASC 606 Adoption on
Balance Sheet as of January 1, 2019**

	As reported under ASC 606	Adjustments	Balances without adoption of ASC 606
Deferred revenue, current portion	\$ (6,202)	\$ 1,295	\$ (4,907)
Deferred revenue, noncurrent portion	\$ (11,474)	\$ (1,602)	\$ (13,076)
Accumulated deficit	\$ (29,719)	\$ (307)	\$ (30,026)

**Impact of ASC 606 Adoption on
Balance Sheet as of December 31, 2019**

	As reported under ASC 606	Adjustments	Balances without adoption of ASC 606
Deferred revenue, current portion	\$ (5,864)	\$ 799	\$ (5,065)
Deferred revenue, noncurrent portion	\$ (13,603)	\$ 235	\$ (13,368)
Accumulated deficit	\$ (79,025)	\$ 1,034	\$ (77,991)

**Impact of ASC 606 Adoption on Statements of Operations and Comprehensive Loss
Year Ended December 31, 2019**

	As reported under ASC 606	Adjustments	Balances without adoption of ASC 606
Collaboration and research revenue	\$ 6,986	\$ 1,341	\$ 8,327
Net loss	\$ (49,306)	\$ 1,341	\$ (47,965)
Net loss per share—basic and diluted	\$ (9.59)	\$ 0.26	\$ (9.33)

**Impact of ASC 606 Adoption on Statements of Cash Flows
Year Ended December 31, 2019**

	As reported under ASC 606	Adjustments	Balances without adoption of ASC 606
Cash flows from operating activities:			
Net loss	\$ (49,306)	\$ 1,341	\$ (47,965)
Changes in operating assets and liabilities:			
Deferred revenue	\$ (3,346)	\$ (1,341)	\$ (4,687)

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In January 2016, the FASB issued ASU 2016-01, *Financial Instruments—Overall: Recognition and Measurement of Financial Assets and Financial Liabilities*. This ASU enhances the reporting model for financial instruments, which includes amendments to address aspects of recognition, measurement, presentation and disclosure. This ASU is effective for fiscal years beginning after December 15, 2018, and interim periods within fiscal years beginning after December 15, 2019. In February 2018, the FASB issued ASU 2018-03, *Technical Corrections and Improvements to Financial Instruments—Overall (Subtopic 825-10)*. This ASU clarified certain aspects of the previously issued standard. This ASU is effective on the same effective date as ASU 2016-01. The adoption of this guidance during the year ended December 31, 2019 did not have an impact on the Company's financial statements.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments*. This ASU requires changes to how cash receipts and cash payments are presented and classified in the statement of cash flows. This ASU is effective for fiscal years beginning after December 15, 2018, and interim periods within fiscal years beginning after December 15, 2019. The adoption of this guidance during the year ended December 31, 2019 did not have an impact on the Company's financial statements.

Recently Adopted Accounting Pronouncements (unaudited)

In June 2018, FASB issued ASU 2018-07, *Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting*. This ASU aligns the measurement and classification guidance for share-based payments to nonemployees with the guidance for share-based payment to employees. Under this ASU, the measurement of equity-classified nonemployee awards will be fixed at the grant date, which may lower their cost and reduce volatility in the statement of operations and comprehensive loss. The transition method provided by this ASU is on a modified retrospective basis, which recognizes a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. This ASU is effective for fiscal years beginning after December 15, 2019, and interim periods within fiscal years beginning after December 15, 2020, with early adoption permitted, but no earlier than a company's adoption date of ASC 606. The Company adopted this guidance effective January 1, 2020 using the modified retrospective method. The Company recorded a less than \$0.1 million (unaudited) cumulative-effect adjustment reflected as a decrease to the opening balance of accumulated deficit and a decrease to additional paid-in capital.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820), Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement*. This ASU amends the disclosure requirement in ASC 820, Fair Value Measurement, by adding, changing, or removing certain disclosures. This ASU applies to all entities that are required under this guidance to provide disclosure about recurring or nonrecurring fair value measurements. The amendments require new disclosures related to: (i) changes in unrealized gains and losses for the period included in other comprehensive income for recurring Level 3 fair value measurements held at the end of the reporting period; and (ii) the range and weighted-average of significant unobservable inputs used to develop Level 3 fair value measurements. In addition, there are certain changes in disclosure requirements in the existing guidance. For all entities, this ASU is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. Early adoption is permitted. The Company adopted this guidance effective January 1, 2020 with relevant updates made to disclosures.

New Accounting Pronouncements Not Yet Adopted

In November 2018, the FASB issued ASU 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606*. This ASU clarifies that certain transactions between participants in a collaborative arrangement should be accounted for under ASC 606, *Revenue from Contracts with Customers*, when the counterparty is a customer. This ASU also precludes an

entity from presenting consideration received from a transaction as revenue from contracts with customers if the counterparty is not a customer for that transaction. This ASU is effective for fiscal years beginning after December 15, 2020, and interim periods within fiscal years beginning after December 15, 2021. Early adoption is permitted for entities that have adopted ASC 606, *Revenue from Contracts with Customers*. The Company is currently evaluating the impact the adoption of this standard will have on its financial statements and related disclosures.

In August 2018, the FASB issued ASU 2018-15, *Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40), Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract*, or ASU 2018-15. ASU 2018-15 requires a customer that is a party to a cloud computing service contract to follow the internal-use software guidance in Subtopic 350-40 to determine which implementation costs to capitalize and which costs to expense. The amendments in this update should be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. This ASU is effective for fiscal years beginning after December 15, 2020, and interim periods within fiscal years beginning after December 15, 2021. The Company is currently evaluating the impact the adoption of this standard will have on its financial statements and related disclosures.

In July 2017, the FASB issued ASU 2017-11, *Earnings Per Share (Topic 260) Distinguishing Liabilities from Equity (Topic 480) Derivatives and Hedging (Topic 815) (Part I) Accounting for Certain Financial Instruments with Down Round Features, (Part II) Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception*. This ASU simplifies the accounting for certain financial instruments with down round features, a provision in an equity-linked financial instrument (or embedded feature) that provides a downward adjustment of the current exercise price based on the price of future equity offerings. Down round features are common in warrants, preferred shares, and convertible debt instruments issued by private companies and early-stage public companies. This ASU requires companies to disregard the down round feature when assessing whether the instrument is indexed to its own stock, for purposes of determining liability or equity classification. The amendments in Part I of this ASU are effective for fiscal years beginning after December 15, 2019, and interim periods within fiscal years beginning after December 15, 2020. Early adoption is permitted. The amendments in Part I should be applied (1) retrospectively to outstanding financial instruments with a down round feature by means of a cumulative-effect adjustment to the balance sheet as of the beginning of the first fiscal year and interim periods; (2) retrospectively to outstanding financial instruments with a down round feature for each prior reporting period presented. The amendments in Part II of this ASU do not require any transition guidance because those amendments do not have an accounting effect. The Company does not expect adoption of this ASU to have a material impact on its financial statements.

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842) (“ASC 842”)*, which sets out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e. lessees and lessors). In July 2018, the FASB issued ASU 2018-10, *Codification Improvements to Topic 842, Leases*, which provides clarification to ASU 2016-02. These ASUs (collectively the “new leasing standard”) require lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease, respectively. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification. Leases with a term of 12 months or less will be accounted for similar to existing guidance for operating leases today. ASC 842 supersedes the previous leases standard, ASC 840, *Leases*. In July 2018, the FASB issued ASU 2018-11, *Leases (Topic 842): Targeted Improvements*, which allows entities to elect an optional

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transition method where entities may continue to apply the existing lease guidance during the comparative periods and apply the new lease requirements through a cumulative effect adjustment in the period of adoption rather than in the earliest period presented. In March 2019, the FASB issued ASU 2019-01, which provides clarification on implementation issues associated with adopting ASU 2016-02. In November 2019, the FASB issued ASU 2019-10, *Financial Instruments—Credit Losses (Topic 326), Derivatives and Hedging (Topic 815), and Leases (Topic 842) Effective Dates*. This ASU provides a one-year deferral of the effective dates of the ASUs on derivatives, hedging and lease for companies that are non-public entities. In June 2020, the FASB issued ASU 2020-05, which deferred the effective date of the new leasing standard by one year for certain entities that have not already issued or made available for issuance their financial statements reflecting the adoption of the standard. ASU 2014-09 is effective for these entities for fiscal years beginning after December 15, 2021, and for interim periods within fiscal years beginning after December 15, 2022. Early adoption is permitted. The Company is currently evaluating the impact the adoption of this standard will have on its financial statements and related disclosures.

3. Fair Value Measurements

The following tables represent the Company's fair value hierarchy for financial assets and financial liabilities measured at fair value on a recurring basis as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited) (in thousands):

	Basis for Fair Value Measurements			Fair Value as of December 31, 2018
	(Level 1)	(Level 2)	(Level 3)	
Assets				
Money market funds	\$91,761	\$ —	\$ —	\$ 91,761
Total	<u>\$91,761</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 91,761</u>
Liabilities				
Derivative liability	\$ —	\$ —	\$ 64	\$ 64
Total	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 64</u>	<u>\$ 64</u>

	Basis for Fair Value Measurements			Fair Value as of December 31, 2019
	(Level 1)	(Level 2)	(Level 3)	
Assets				
Money market funds	\$15,876	\$ —	\$ —	\$ 15,876
Total	<u>\$15,876</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 15,876</u>
Liabilities				
Derivative liability	\$ —	\$ —	\$ 101	\$ 101
Total	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 101</u>	<u>\$ 101</u>

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	Basis for Fair Value Measurements			Fair Value as of September 30, 2020
	(Level 1)	(Level 2)	(Level 3)	
Assets				
Money market funds	\$88,755	\$ —	\$ —	\$ 88,755
Total	<u>\$88,755</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 88,755</u>
Liabilities				
Derivative liability	\$ —	\$ —	\$ 117	\$ 117
Total	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 117</u>	<u>\$ 117</u>

Level 3 Inputs

The fair value of the warrant obligation is based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The fair value of the common stock warrant obligation was determined using the Black-Scholes option pricing model. In determining the fair value of the common stock warrant obligation, the inputs impacting fair value include the expected term, expected volatility, risk-free interest rate and dividend yield. See Note 13 for further discussion on common stock warrant obligation.

The fair value of the derivative liability is based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The fair value of the derivative liability was determined using a present value analysis with multiple scenarios. In determining the fair value of the derivative liability, the inputs impacting fair value include the change of control payment to CFFT, the probability of a change of control event, the product status at time of a change of control event and the discount rate. See Note 15 for further discussion on embedded derivative.

There were no transfers between Level 1, 2 and 3 during the periods presented.

The following table sets forth a summary of the changes in the fair value of the Company's Level 3 financial instruments (in thousands):

	Common Stock Warrant Obligation	Derivative Liability
Balance as of December 31, 2017	\$ 60	\$ 78
Issuance of common stock warrant	(59)	—
Change in fair value included in other income (expense), net	(1)	(14)
Balance as of December 31, 2018	\$ —	\$ 64
Change in fair value included in other income (expense), net	—	37
Balance as of December 31, 2019	\$ —	\$ 101
Change in fair value included in other income (expense), net (unaudited)	—	16
Balance as of September 30, 2020 (unaudited)	<u>\$ —</u>	<u>\$ 117</u>

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4. Property and Equipment, Net

Property and equipment, net, consisted of the following (in thousands):

	December 31, 2018	December 31, 2019	September 30, 2020 (Unaudited)
Machinery and equipment	\$ 2,433	\$ 3,761	\$ 4,636
Leasehold improvements	1,349	2,405	2,527
Furniture and fixtures	182	541	596
Office equipment	74	98	121
Computer equipment and software	52	306	366
Construction in progress	34	563	432
Total property and equipment	4,124	7,674	8,678
Less: Accumulated depreciation and amortization	(1,652)	(2,625)	(3,697)
Property and equipment, net	<u>\$ 2,472</u>	<u>\$ 5,049</u>	<u>\$ 4,981</u>

All property and equipment are maintained in the United States. Depreciation expense was \$0.7 million and \$1.0 million for the years ended December 31, 2018 and 2019 and \$0.7 million (unaudited) and \$1.1 million (unaudited) for the nine months ended September 30, 2019 and 2020, respectively.

5. Accrued and Other Current Liabilities

Accrued and other current liabilities consisted of the following (in thousands):

	December 31, 2018	December 31, 2019	September 30, 2020 (Unaudited)
Payroll and related	\$ 1,313	\$ 2,133	\$ 2,110
Accrued clinical and preclinical study costs	75	494	978
Consulting and professional	549	2,239	3,947
Other accrued expenses	256	481	332
	<u>\$ 2,193</u>	<u>\$ 5,347</u>	<u>\$ 7,367</u>

6. Research and Collaboration Arrangements

Collaboration and license revenue for each period was as follows (in thousands):

	Revenue			
	Year Ended December 31,		Nine Months Ended September 30,	
	2018	2019	2019	2020
uniQure	\$ 143	\$ 26	\$ 26	\$ 504
Benitec	200	7	7	—
AGTC	272	—	—	—
CRF	—	—	—	—
Pfizer	5,000	—	—	—
Roche	7,460	6,287	4,354	14,174
CFFT	55	118	21	(89)
AstraZeneca	1,000	548	548	—
	<u>\$ 14,130</u>	<u>\$ 6,986</u>	<u>\$ 4,956</u>	<u>\$ 14,589</u>

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Deferred revenue for each period was as follows (in thousands):

	Deferred Revenue		
	As of December 31, 2018	As of December 31, 2019	As of September 30, 2020
uniQure	\$ —	\$ 5,137	\$ 4,634
Benitec	183	—	—
AGTC	—	—	—
CRF	—	—	—
Pfizer	—	—	—
Roche	17,055	13,640	11,937
CFFT	245	690	779
AstraZeneca	500	—	—
	<u>\$ 17,983</u>	<u>\$ 19,467</u>	<u>\$ 17,350</u>

The total amount of revenue in the year ended December 31, 2019, which was included in deferred revenue at January 1, 2019, was \$3.6 million. The total amount of revenue in the nine months ended September 30, 2020, which was included in deferred revenue at January 1, 2020, was \$4.0 million (unaudited).

uniQure

In January 2014, the Company and uniQure biopharma B.V. (“uniQure”) entered into a Collaboration and License Agreement (the “uniQure Agreement”) to collaborate on the discovery and non-clinical research activities related to the Company’s Therapeutic Vector Evolution platform in order to generate and validate vectors for gene delivery to treat diseases within the central nervous system and liver (together, the “uniQure Field”).

The uniQure Agreement provided uniQure with a research license as well as an exclusive development and commercialization license for each project variant selected for further development. The initial research term is three years with an option for uniQure to extend the research term one time for an additional year. Once the Company’s research plan has concluded, uniQure is solely responsible for the continued development, manufacturing and commercialization of the project variants as potential product candidates. In October 2016, uniQure exercised its option to extend the research term for an additional year to January 2018. The Company was also required to work exclusively with uniQure in the uniQure Field (the “uniQure Exclusivity Clause”).

Pursuant to the uniQure Agreement, the Company received upfront payments of \$0.2 million, and was entitled to receive (i) contingent payments for the achievement of research and development milestones of up to \$5.0 million for each licensed product selected under the arrangement, and (ii) royalties in the single digit range on future sales of the potential product candidates and sublicense consideration in the low teens to low thirties range on any future sublicensing arrangements. The Company also received capped research and development service fees based on contractual full-time employee rates per year. In connection with the performance obligations under the uniQure Agreement, the founders of 4D Molecular Therapeutics, LLC received equity options to purchase an aggregate of 609,744 of uniQure ordinary shares that vest over the initial three-year term of the agreement.

The upfront payment of \$0.2 million was recorded as deferred revenue and was recognized on a ratable basis over the estimated performance period of four years. Payments and reimbursements for research costs were recognized on an as-incurred basis. The options to purchase uniQure shares

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were deemed to be a noncash component of the arrangement consideration, as the vesting of options is linked to the uniQure Agreement and there is a requirement for the holders of the options to provide services under the agreement. The fair value of the uniQure options, which was estimated to be \$10.6 million, was recognized ratably as revenue over the estimated performance period of four years and the associated compensation expense related to the stock options were recorded as research and development expense.

In August 2019, the Company and uniQure entered into an Amended and Restated Collaboration and License Agreement (the "Amended uniQure Agreement"), which amended and restated the uniQure Agreement, and a separate Collaboration and License Agreement (the "Second uniQure Agreement"). Under these agreements, the Company agreed to transfer incremental rights and services to uniQure in exchange for uniQure eliminating the uniQure Exclusivity Clause and transferring other rights back to the Company.

Under the Amended uniQure Agreement, uniQure continues to have an exclusive license to select AAV capsid variants (the "Selected Variants") in the uniQure Field. uniQure continues to be solely responsible, at its cost, to develop and commercialize the compounds and products containing the Selected Variants. The amended uniQure Agreement eliminated the uniQure Exclusivity Clause in the uniQure Agreement. Furthermore, the contingent payments that the Company was entitled to from uniQure for the achievement of research and development milestones of up to \$5.0 million for each licensed product selected under the uniQure Agreement were eliminated and sublicense consideration on any future sublicensing arrangements was reduced from the low teens to low thirties percentages to mid-single digit to mid-twenties percentages.

Under the Second uniQure Agreement, the parties agreed to research and develop new AAV capsid variants (the "New Variants") that are not Selected Variants that affect certain targets selected by uniQure (the "uniQure Targets") in the uniQure Field. The Company is solely responsible, at its cost, for the research of the New Variants. The Company granted uniQure an exclusive license to a certain number of the New Variants (the "uniQure New Variants") that affect the uniQure Targets. uniQure is solely responsible, at its cost, to develop and commercialize the compounds and products containing the uniQure New Variants that affect the uniQure Targets (the "Licensed Products"). The Company retains all rights to New Variants in the uniQure Field that affect targets other than the uniQure Targets.

Under both the Amended uniQure Agreement and the Second uniQure Agreement, uniQure will be required to pay the Company royalties on worldwide annual net sales of Licensed Products at a mid-single digit percentage rate, subject to certain specified reductions. uniQure will also be required to pay the Company sublicense consideration for sublicensing the Company's intellectual property rights licensed under the Amended uniQure Agreement or the Second uniQure Agreement to third parties at a rate between the mid-single digit to mid-twenties. The Company has reciprocal obligations, at the same percentage rates as uniQure, to pay uniQure royalties and sublicense consideration for sublicensing certain intellectual property rights licensed under the Amended uniQure Agreement or the Second uniQure Agreement to third parties.

The Company concluded that the Amended uniQure Agreement and the Second uniQure Agreement should be accounted for as one combined contract that should be accounted for as a separate contract from the uniQure Agreement given that the incremental licensed intellectual property rights and research and development services are distinct from the rights and services previously transferred to uniQure under the uniQure Agreement and the transaction price increased by an amount that equals the standalone selling price of the incremental rights and services to be transferred to uniQure under the Amended uniQure Agreement and Second uniQure Agreement.

Neither party was required to pay monetary consideration in connection with the execution of the Amended uniQure Agreement or the Second uniQure Agreement or for subsequent performance by

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the parties under those agreements, notwithstanding the potential future royalty and sublicense consideration described above. The fair value of the non-monetary consideration given by uniQure to the Company, for the intellectual property right is \$5.1 million. This intellectual property right is considered to be an in-process research and development asset with no alternative future use and, accordingly, was written off as acquired in-process research and development expense in the year ended December 31, 2019.

The incremental transaction price described in the paragraph above was recorded as deferred revenue given that the Company identified one single combined performance obligation under ASC 606, which includes the licenses to the New Variants, research services and participation in the joint steering committee (“JSC”). Revenue will be recognized using the input method based on actual costs incurred as a percentage of total budgeted costs as the Company completes its performance obligation. Based on the current estimated timelines, the deferred revenue is expected to be recognized as revenue over approximately three to four years from December 31, 2019.

The Company determined the transaction price using the risk adjusted net present value analysis (“rNPV”) methodology to value the elimination of the uniQure exclusivity clause and other material rights received by the Company, including the potential royalties the Company would receive from uniQure. The rNPVs incorporate estimates and assumptions including the number of products the Company and uniQure would develop, the risk-adjusted probability of successfully developing a biopharmaceutical product, the probability that uniQure will develop a product, the research and development costs, the potential worldwide sales and associated commercialization costs, corporate tax rate, and discount rate.

During the years ended December 31, 2018 and 2019, the Company recognized revenue of \$0.1 million and less than \$0.1 million under the uniQure Agreement, respectively. During the year ended December 31, 2019, no revenue has been recognized in connection with the Amended uniQure Agreement or Second uniQure Agreement. During the nine months ended September 30, 2019, the Company recognized revenue of less than \$0.1 million (unaudited) in connection with the uniQure Agreement. During the nine months ended September 30, 2020, the Company recognized revenue of \$0.5 million (unaudited) in connection with the Amended uniQure Agreement and Second uniQure Agreement. As of December 31, 2018, December 31 2019 and September 30, 2020, deferred revenue relating to uniQure was \$0, \$5.1 million and \$4.6 million (unaudited), respectively. There were no amounts due from uniQure under the uniQure Agreement, Amended uniQure Agreement or Second uniQure Agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited). As of December 31, 2019, the aggregate amount of the transaction price allocated to the remaining performance obligation was \$5.1 million. No adjustment was necessary upon adoption of ASC 606 because the uniQure Agreement was substantially completed as of January 1, 2019.

Benitec

In November 2014, the Company and Benitec Biopharma Limited (“Benitec”) entered into a collaboration and license agreement to collaborate on the discovery and non-clinical research activities related to the Company’s Therapeutic Vector Evolution platform in order to generate and validate vectors for gene delivery to treat certain ophthalmic diseases (the “Benitec Agreement”). Benitec has the option of nominating up to three project variants as part of the Benitec Agreement.

The Benitec Agreement provides Benitec with a temporary research license as well as an exclusive development and commercialization license for each project variant selected to further develop. The initial research term is two years and is automatically extended in six-month increments, if necessary, in order to complete additional required studies, for a maximum of five years. Once the

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Company's research plan has concluded, Benitec is solely responsible for the continued development, manufacturing and commercialization of the project variants as potential product candidates.

Pursuant to the Benitec Agreement, the Company received as consideration (i) an upfront payment of \$0.5 million, (ii) capped research and development service fees based in part on prescribed full-time equivalent labor rates and (iii) reimbursements of pass-through and overhead costs incurred on behalf of Benitec.

On January 24, 2017, the Benitec Agreement was amended to give Benitec sole responsibility for the performance of certain research work which would have generated research services revenue for the Company under the original agreement. Pursuant to the amendment, the Company received \$0.5 million as consideration. This \$0.5 million was recorded as deferred revenue and is being recognized over the same period as the upfront payment.

In March 2019, the Benitec Agreement was terminated based on mutual agreement between the Company and Benitec.

Under ASC 605, *Revenue Recognition*, the payments of \$1.0 million were recorded as deferred revenue and were being recognized on a ratable basis over the estimated performance period of five years. Payments and reimbursements for research costs, including pass-through and other out-of-pocket costs, were recognized on an as-incurred basis under ASC 605. Under ASC 606, the Company uses the input method to measure progress toward completion of the performance obligation and concluded that revenue will be recognized based on actual costs incurred as a percentage of total budgeted costs as the Company completes its performance obligation. Upon the adoption of ASC 606 on January 1, 2019, the Company recorded an additional \$0.2 million of cumulative revenue through a decrease in deferred revenue and decrease in the beginning accumulated deficit, based on the difference between the input method used under ASC 606 and the ratable recognition previously used under ASC 605.

The Company identified one combined performance obligation to provide the research license, exclusive development and commercialization licenses for each project variance selected to further develop, research services and participation in the JSC. The transaction price included the \$1.0 million non-refundable upfront fees and \$2.4 million reimbursement for costs incurred and the value of labor hours expended. The Company excluded any consideration related to sales-based milestones, including royalties, which are recognized when the related sales occur. For the year ended December 31, 2019, there was no change in the transaction price.

During the years ended December 31, 2018 and 2019, the Company recognized revenue of \$0.2 million and less than \$0.1 million under the Benitec Agreement, respectively. During the nine months ended September 30, 2019 and September 30, 2020, the Company recognized revenue of less than \$0.1 million (unaudited) and \$0 (unaudited), respectively. As of December 31, 2018, December 31, 2019 and September 30, 2020, deferred revenue relating to the Benitec Agreement was \$0.2 million, \$0 and \$0 (unaudited), respectively. There were no amounts due from Benitec under the Benitec Agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited), respectively. Upon termination of the Benitec Agreement in March 2019, the Company had no further obligations impacting revenue recognition.

AGTC

In April 2015, the Company entered into a collaboration and option agreement with Applied Genetic Technologies Corporation ("AGTC") to discover and develop optimized AAV vectors to treat specific ophthalmic disease indications with high unmet medical need (the "AGTC Agreement"). The

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AGTC Agreement included both a research funding component as well as a licensing component, wherein AGTC was granted the option to license up to three resulting project variants for up to six products for further development and commercialization. The AGTC Agreement expired in October 2018 when AGTC did not exercise their option to license during the option period.

In accordance with ASC 605, the Company identified the following deliverables at the inception of the AGTC Agreement: (i) the research license, (ii) research services, and (iii) participation in a joint research steering committee. The Company determined that neither the research license nor participation in the joint research steering committee has stand-alone value to AGTC due to the specialized nature of the research services to be provided by the Company, and accordingly, this deliverable was combined with the research services as a single unit of accounting. Further, at the inception of the AGTC Agreement, AGTC's options to obtain an exclusive development and commercialization license for each research project target did not represent deliverables because they are substantive options and do not contain a significant or incremental discount. No adjustment was necessary upon adoption of ASC 606. The Company elected to use the practical expedients permitted related to adoption, which do not require the Company to apply the revenue standard to contracts that are completed as of the date of initial application.

Pursuant to the AGTC Agreement, the Company received two upfront payments totaling \$3.0 million as consideration. The upfront payments of \$3.0 million were recorded as deferred revenue and were recognized on a ratable basis over the estimated performance period of three years.

Revenue was fully recognized on the AGTC Agreement in the year ended December 31, 2018. During the years ended December 31, 2018 and 2019, the Company recognized revenue of \$0.3 million and \$0, respectively. As of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited), deferred revenue relating to the AGTC Agreement was \$0. No amount was due from AGTC under the AGTC Agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited).

CRF

In November 2015, the Company entered into a research funding and collaboration agreement (the "CRF Agreement") with the Choroideremia Research Foundation ("CRF"), a non-profit organization dedicated to finding a cure for choroideremia, a rare inherited disorder that causes progressive vision loss, ultimately leading to complete blindness. The goal of the CRF Agreement is for CRF to contribute funding to help with the advancement of the Company's choroideremia research program. The Company is responsible for all decision making and execution of any and all of the related activities to be completed in its sole discretion. The initial term of the CRF Research Plan is two years. The agreement includes contribution to CRF of up to \$2.5 million upon certain development or approval milestones. The overall arrangement has automatic extensions of up to three additional years. As of December 31, 2019 and September 30, 2020 (unaudited), no milestones have been achieved.

Revenue was fully recognized for this agreement in the year ended December 31, 2017. There was no deferred revenue relating to the CRF Agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited). No amount was due from CRF under the CRF Agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited).

No adjustment was necessary upon adoption of ASC 606. The Company elected to use the practical expedient permitted related to adoption, which does not require the Company to apply ASC 606 to contracts that are completed as of the date of initial application.

Pfizer

In December 2015, the Company signed a collaboration and license agreement (the "Pfizer Agreement") with Pfizer, Inc. ("Pfizer"). Under the terms of the Pfizer Agreement, the Company agreed to deploy its Therapeutic Vector Evolution platform to generate and validate up to three project variants for gene delivery to treat diseases in cardiac tissue. Once the Company's research activities concluded, Pfizer would be solely responsible for the continued development, manufacturing and commercialization of the project variants as potential product candidates.

Pursuant to the Pfizer Agreement, the Company received a non-refundable upfront payment of \$5.0 million as consideration. No revenue was recognized under the Pfizer Agreement until Pfizer terminated this agreement for convenience in December 2018. The entire upfront payment of \$5.0 million was recognized as revenue in December 2018 as the Company had no further obligations impacting revenue recognition. As of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited), deferred revenue relating to the Pfizer Agreement was \$0. No amount was due from Pfizer under the Pfizer Agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited).

No adjustment was necessary upon adoption of ASC 606. The Company elected to use the practical expedient permitted related to adoption, which does not require the Company to apply ASC 606 to contracts that are completed as of the date of initial application.

Roche

In November 2017, the Company entered into a collaboration and license agreement with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc. (together, "Roche") to discover and develop products containing optimized next generation AAV Vectors focused on ophthalmological diseases and disorders excluding select criteria (the "2017 Roche Agreement"). The Company and Roche both have the ability to nominate products to discover, develop and commercialize.

At the effective date, choroideremia was designated a Roche product. The Company is responsible for conducting research and development services prior to pivotal clinical studies, and Roche is responsible for conducting subsequent development and commercialization activities. In addition, Roche agreed to pay for research and development services at the agreed upon full-time employee rate for work performed for choroideremia under the 2017 Roche Agreement, except for the costs associated with the manufacturing work for choroideremia.

For any product that the Company nominates and conducts research and development services under the 2017 Roche Agreement prior to pivotal clinical studies, Roche has an option to convert the status of the product to a Roche product during the 90-day option period. If Roche chooses to not exercise its option, the Company can continue subsequent development and commercialization activities and Roche will have no further rights with respect to such product.

Pursuant to the 2017 Roche Agreement, the Company received an upfront payment of \$21.0 million as consideration. In addition, the Company is entitled to contingent payments including (i) \$1.0 million for each Roche nominated product beyond the first three, (ii) up to \$30.0 million upon exercise of the option to convert a product the Company nominated and developed prior to pivotal clinical studies (iii) development milestone payments of up to \$223.0 million, of which \$86.0 million relates to choroideremia and the rest relate to other licensed products; and (iv) sales-based milestones of up to \$123.0 million in connection with licensed products. The 2017 Roche Agreement also includes provisions that entitle the Company to receive royalty payments ranging from the mid-single digits to the mid-teens for the net sales of the licensed products, in each case subject to the reductions in accordance with the terms of the agreement.

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Under ASC 605, the upfront payment of \$21.0 million was recorded as deferred revenue and was being recognized on a ratable basis over the estimated performance period of five and a half years. Under ASC 606, the Company uses the input method to measure progress toward completion of the performance obligation and concluded that revenue will be recognized based on actual resources consumed, labor hours expended and costs incurred as a percentage of total budgeted costs. Upon the adoption of ASC 606, the Company recognized an additional \$0.4 million of cumulative revenue through a decrease to deferred revenue and a decrease in the beginning accumulated deficit, based on the difference between the input method used under ASC 606 and the ratable recognition previously used under ASC 605.

Under ASC 606, the Company identified one single combined performance obligation for the license, research services and participation in the JSC. Furthermore, the Company concluded that at the inception of the agreement, Roche's option, exercisable prior to pivotal clinical study initiation, does not represent a material right and should be allocated to the single performance obligation and recognized as revenue upon Roche's exercise of the option. The transaction price related to the agreement upon adoption of ASC 606 included the \$21.0 million non-refundable upfront fee and \$10.7 million for estimated reimbursements for research and development services at the agreed upon full-time employee rate and third party costs. The Company's contract with Roche does not include a significant financing component. The Company concluded that the transaction price should not include the variable consideration related to development milestones as they were considered to be constrained as it is probable that the inclusion of such variable consideration could result in a significant reversal of cumulative revenue in the future. The Company excluded any consideration related to sales-based milestones, including royalties, which are recognized when the related sales occur. The transaction price and estimated period of performance will be re-evaluated at each reporting period. For the year ended December 31, 2019, an adjustment of \$4.5 million was made to the transaction price to reflect an increase in the scope of the project and expected reimbursable costs. For the nine months ended September 30, 2019, an adjustment of \$4.2 million (unaudited) was made to the transaction price to reflect an increase in the scope of the project and expected reimbursable costs. For the nine months ended September 30, 2020, an adjustment of \$15.1 million (unaudited) was made to the transaction price to reflect an increase of \$5.1 million (unaudited) in the scope of the project and expected reimbursable costs and the addition of \$10.0 million (unaudited) of variable consideration as the uncertainty associated with two development milestones was resolved. The increase in the transaction price and total budgeted costs resulted in a \$1.6 million decrease in revenue recognized in the year ended December 31, 2019 related to performance obligations partially satisfied in periods prior to January 1, 2019. For the nine months ended September 30, 2019 and 2020, the change in the transaction price and total budgeted costs resulted in a decrease of \$1.5 million (unaudited) and an increase of \$7.1 million (unaudited) in revenue recognized related to performance obligations partially satisfied in periods prior to January 1, 2019 and January 1, 2020, respectively.

During the years ended December 31, 2018 and 2019, the Company recognized revenue of \$7.5 million and \$6.3 million, respectively. During the nine months ended September 30, 2019 and 2020, the Company recognized revenue of \$4.4 million (unaudited) and \$14.2 million (unaudited), respectively. As of December 31, 2018, December 31, 2019 and September 30, 2020, deferred revenue relating to the Roche Agreement was \$17.1 million, \$13.6 million and \$11.9 million (unaudited), respectively. Accounts receivable from Roche under this agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 was \$1.1 million, \$0.6 million and \$0.9 million (unaudited), respectively. As of December 31, 2019 and September 30, 2020, the aggregate amount of the transaction price allocated to the remaining performance obligation was \$21.6 million and \$22.6 million (unaudited), respectively. Based on current timelines, the deferred revenue is expected to be recognized as revenue over the next four to six years as the Company continues to develop nominated products until the initiation of pivotal studies.

CFFT

In September 2016, the Company entered into an award agreement for the Optimized Adeno-Associated Virus for Lung Epithelia Gene Delivery Development Program with CFFT, a non-profit organization dedicated to finding a cure for cystic fibrosis, an inherited disorder that causes disease in the pulmonary airways leading to morbidity and mortality. Under this agreement, CFFT contributes funding to help advance the Company's CF research program. The agreement was subsequently amended in September 2017 and August 2018 (all three agreements are collectively referred to as the "CFFT Agreements"). The total amount of the award under the CFFT Agreements is \$3.5 million. As of December 31, 2018, December 31, 2019 and September 30, 2020, the Company achieved milestones totaling \$0.6 million, \$0.9 million and \$0.9 million (unaudited) under the CFFT Agreements, respectively. The remaining award amount will be paid by CFFT based on achievement of certain development milestones by the Company.

The Company expects to make payments to CFFT equal to six times the actual award received by the Company in three installments within the first four years of the first commercial sale of a product developed under this agreement. The Company also has agreed to make future sales-based milestone payments to CFFT of up to three times the actual award received upon achieving specified commercialization milestones with respect to the first of any product developed utilizing any compound covered under the collaboration agreement. The CFFT Agreements also require the Company to pay to CFFT royalties of a mid-single digit percentage, up to six times the actual award received, on any amounts received by the Company from the sale, license or transfer to a third-party of rights in the technology developed as a result of this collaboration. Any such royalty payments shall be credited against the payments owed by the Company upon first commercial sale. In the event of a change of control of the Company, CFFT will receive certain payments, depending on the timing of the change of control and the size of the transaction.

To date, the Company has not developed a commercial product in connection with this award agreement, and it has not licensed, sold or otherwise transferred to another party the product developed under the agreement or the underlying technology.

If at any time prior to the first commercial sale of a product developed as a result of the agreement, the Company ceases to use commercially reasonable efforts to develop or commercialize any product under this agreement for a continuous period of 180 consecutive days and fails to present a reasonable plan to resume commercially reasonable efforts, the Company will grant to CFFT an irrevocable, exclusive worldwide interruption license under all of the Company's interest in the research plan technology to exploit such product. Any third-party license granted by the Company shall be subject to such interruption license.

Under ASC 605, the Company recognized revenue under this agreement on a ratable basis over the estimated performance period of all milestones. Under ASC 606, the Company uses the input method to measure progress toward completion of the performance obligation and concluded that revenue will be recognized based on actual resources consumed, labor hours expended and costs incurred as a percentage of total budgeted costs. Upon the adoption of ASC 606, the Company decreased cumulative revenue by \$0.2 million through an increase to deferred revenue and an increase to beginning accumulated deficit, based on the difference between the input method under ASC 606 and the ratable recognition previously used under ASC 605.

Under ASC 606, the Company identified one performance obligation within the CFFT grant agreement for research activities. The transaction price related to the agreement upon the adoption of ASC 606 included the \$0.6 million non-refundable milestones previously met under the CFFT Agreement. The Company's contract with CFFT does not include a significant financing component.

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The Company concluded that the transaction price should not include the variable consideration related to future research milestones as they were considered to be constrained as it is probable that the inclusion of such variable consideration could result in a significant reversal of cumulative revenue in the future. The Company will re-evaluate the transaction price and estimated period of performance at each reporting period. For the year ended December 31, 2019, an adjustment of \$0.4 million was made to the transaction price to reflect the achievement of the second milestone related to in vivo screening of AAV library under the CFFT agreement.

During each of the years ended December 31, 2018 and 2019, the Company recognized revenue of \$0.1 million. During the nine months ended September 30, 2019 and 2020, the Company recognized revenue of less than \$0.1 million (unaudited) and \$(0.1) million (unaudited), respectively. As of December 31, 2018, December 31, 2019 and September 30, 2020, deferred revenue relating to the CFFT Agreement was \$0.2 million, \$0.7 million and \$0.8 million (unaudited), respectively. Accounts receivable from CFFT under this agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 was \$0, \$0.4 million and \$0 (unaudited), respectively. As of December 31, 2019 and September 30, 2020, the aggregate amount of the transaction price allocated to the remaining performance obligation was \$0.7 million and \$0.8 million (unaudited), respectively. Based on current timelines, the deferred revenue is expected to be recognized as revenue over the next four to five years as the Company performs research services through the completion of IND-enabling studies.

The obligation to make payments to CFFT upon a change of control meets the definition of an embedded derivative that is required to be bifurcated and separately accounted for as a derivative liability. The Company determined the estimated fair value of this derivative liability to be \$0.1 million as of December 31, 2018, December 31, 2019 and September 30, 2020. See Note 15 for further discussion of the embedded derivative.

AstraZeneca

In December 2017, the Company entered into a collaboration and option agreement with MedImmune, Inc., the global biologics research and development arm of AstraZeneca, ("AstraZeneca") to discover and develop optimized AAV vectors to treat specific lung disease indications (the "AstraZeneca Agreement"). The AstraZeneca agreement included both a research funding component as well as a licensing component, wherein AstraZeneca was granted the option to license up to three resulting project vector variants for further development and commercialization.

The initial research term was approximately twelve months with AstraZeneca's option to extend the term for an additional six months. AstraZeneca requested the six-month extension in October 2018. AstraZeneca's option to license the resulting project variants expires twelve months after the conclusion of the research phase. Once the Company's research activities have concluded, AstraZeneca is solely responsible for the continued development, manufacturing and eventual commercialization of the project variants as potential product candidates.

Pursuant to the AstraZeneca Agreement, the Company received an upfront payment of \$1.5 million as consideration. In addition, the Company is entitled to contingent payments including (i) a non-refundable license option exercise fee of \$2.0 million and (ii) milestones up to \$45.0 million for each product. The AstraZeneca Agreement also includes provisions that entitle the Company to receive royalties in the single digit range on future sales of the potential product candidates.

The Company has identified one single combined performance obligations within the AstraZeneca agreement for the research program license, research and development activities and participation in the joint project team and JSC. The Company concluded that the performance obligations are not distinct and, therefore, should be combined into a single combined performance

obligation. Furthermore, the Company concluded that at the inception of the agreement, AstraZeneca's license option, does not represent a material right and should be allocated to the single performance obligation and recognized as revenue upon AstraZeneca's exercise of the Option.

The transaction price related to the agreement consists of the \$1.5 million non-refundable upfront fee. The Company concluded that the transaction price should not include the variable consideration related to developmental milestones as they were considered to be constrained as it is probable that the inclusion of such variable consideration could result in a significant reversal of cumulative revenue in the future. The Company excluded any consideration related to sales-based milestones, including royalties, which are recognized when the related sales occur. The Company will re-evaluate the transaction price and estimated period of performance at each reporting period. The Company's contract with AstraZeneca does not include a significant financing component.

Under ASC 605, the \$1.5 million upfront payment was recorded as deferred revenue and was being recognized as revenue on a ratable basis over the estimated performance period of one and a half years. Under ASC 606, the Company used the input method to measure progress toward completion of the performance obligation and concluded that revenue will be recognized based on actual resources consumed, labor hours expended and costs incurred as a percentage of total budgeted costs. Upon the adoption of ASC 606, the Company reduced cumulative revenue by \$48,000 through an increase to deferred revenue and an increase to the beginning accumulated deficit, based on the difference between the input method used under ASC 606 and the ratable recognition previously used under ASC 605.

In June 2019, the research phase concluded and the Company delivered its final report to AstraZeneca. The option term continues for twelve months after AstraZeneca's receipt of the final report where they may exercise the option to obtain the license of up to three project vector variants. In June 2020, AstraZeneca's option to obtain the license of up to three project vector variants under the AstraZeneca Agreement expired unexercised (unaudited).

During the years ended December 31, 2018 and 2019, the Company recognized revenue of \$1.0 million and \$0.5 million, respectively. During the nine months ended September 30, 2019 and 2020, the Company recognized revenue of \$0.5 million (unaudited) and \$0 (unaudited), respectively. As of December 31, 2018, December 31, 2019 and September 30, 2020, deferred revenue relating to the AstraZeneca Agreement was \$0.5 million, \$0 and \$0 (unaudited), respectively. No amount was due from AstraZeneca under this agreement as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited).

7. License Arrangements

The Company has exclusive, worldwide license agreements (the "UC Agreements") with the Regents of the University of California (the "UC Regents") relating to the use of certain patents and intellectual property surrounding its core technologies, including Therapeutic Vector Evolution. Pursuant to each of the UC Agreements executed prior to January 2019, the Company was obligated to pay a (i) non-refundable license fee of \$5,000 upon execution, (ii) a non-refundable license fee of \$5,000 each year thereafter, until sales of a licensed product are made and royalties are paid to the UC Regents, (iii) reimbursement of domestic and foreign patent filing, prosecution and maintenance fees, and (iv) either \$50,000 or issuance of a 3% equity interest in the Company upon the closing of the first qualified financing at the option of the UC Regents. The Company's first qualified financing occurred in 2015 and at the election of the UC Regents, the Company issued the UC Regents in January 2016 an amount of common stock equal to 6% of the equity interests in the Company pursuant to the applicable clause in each of the UC Agreements.

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Pursuant to an agreement with the UC Regents executed in January 2019 the Company paid a non-refundable license fee of \$50,000 to the UC Regents upon execution of the agreement. The Company is obligated to pay a non-refundable license fee of \$5,000 on the one-year anniversary of the contract effective date and each year thereafter, until sales of a licensed product are made and royalties are paid to the UC Regents.

In addition, the Company is obligated to make certain contingent payments including (i) development milestones up to \$3.1 million, (ii) low single digit royalties on the net sales of its developed products that consists of a minimum annual royalty of up to \$0.1 million per year for the term of the Agreement beginning in the first calendar year after the year in which net sales first occurred, and (iii) sublicense consideration in the mid-teens to the mid-twenties-range on any future sublicensing arrangements the Company may enter into with third-party licensees.

During the years ended December 31, 2018 and 2019, the Company incurred expenses of \$0.1 million and \$0.3 million, respectively, under the provisions of the UC Agreements. During the nine months ended September 30, 2019 and 2020, the Company incurred expenses of \$0.2 million (unaudited) and \$0.1 million (unaudited), respectively, under the provisions of the UC Agreements.

8. Commitments and Contingencies

Operating Lease Commitments

In May 2015, the Company executed a lease agreement for office and laboratory space in Emeryville, California. In January 2016, the Company executed the first amendment to the lease agreement for additional rentable office and laboratory space which extends the lease to March 31, 2023. In October 2018, the Company executed a second amendment to extend the lease to end at the same time as the new lease discussed below. Additionally, the second amendment provided a tenant improvement allowance of \$0.2 million, which was paid to the Company in November 2018. The Company amortizes the tenant improvement allowance on a straight-line basis over the remaining term of the lease as a reduction of rent expense.

In October 2018, the Company executed a second lease agreement for additional office and laboratory space in Emeryville, California. The new lease has an initial term of 87 months beginning on the rent commencement date with the option to renew the lease for one additional term of five years. The Company did not have to pay rent until October 2019. This lease agreement also provided for a tenant improvement allowance of \$0.4 million, which was paid to the Company in December 2019. The Company amortizes the tenant improvement allowance on a straight-line basis over the remaining term of the lease as a reduction of rent expense.

In May 2019, the Company amended the second lease agreement executed in October 2018 to add additional office and laboratory space. The amendment extended the term of the lease to December 31, 2029. The Company did not have to pay rent until December 2019. The annual rent for the additional space is \$1.0 million per annum and escalates at 3% annually. This lease agreement also provides for a tenant improvement allowance of at least \$1.6 million.

The Company recognizes rent expense on a straight-line basis over the lease term with the difference between the rent payments and the straight-line rent expense recorded as deferred rent. Rent expense for the years ended December 31, 2018 and 2019 and the nine months ended September 30, 2019 and 2020 for these facilities was \$0.5 million, \$1.3 million, \$0.8 million (unaudited) and \$2.3 million (unaudited), respectively. Deferred rent (included in prepaid expenses and other current assets on the balance sheets) as of December 31, 2018, December 31, 2019 and September 30, 2020 was \$0.4 million, \$1.2 million and \$1.5 million (unaudited), respectively. In

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conjunction with the lease agreements and amendments, the Company paid total security deposits of \$0.3 million, \$0.6 million and \$0.6 million (unaudited), which are included in other assets within the balance sheets as of December 31, 2018, December 31, 2019 and September 30, 2020, respectively.

The following table summarizes the Company's future minimum commitments under lease contracts (in thousands):

As of December 31, 2019	
2020	\$ 2,759
2021	2,893
2022	2,973
2023	3,058
2024	3,149
2025 and beyond	<u>15,064</u>
Total	<u>\$29,896</u>
As of September 30, 2020 (unaudited)	
Remainder of 2020	\$ 737
2021	3,000
2022	3,079
2023	3,159
2024	3,249
2025 and beyond	<u>15,089</u>
Total	<u>\$28,313</u>

Common Stock Warrant Obligation

As of December 31, 2017, the Company had an obligation to issue a warrant for 23,669 shares of the Company's common stock to a service provider. The Company issued the warrant in May 2018. See Note 13 for further discussion on the common stock warrant obligation.

Indemnification Agreements

In the ordinary course of business, the Company enters into agreements that may include indemnification provisions, such as with vendors and other parties. Pursuant to such agreements, the Company may indemnify, hold harmless and defend an indemnified party for losses suffered or incurred by the indemnified party. Some of the provisions will limit losses to those arising from third-party actions. In some cases, the indemnification will continue after the termination of the agreement. The maximum potential amount of future payments the Company could be required to make under these provisions is not determinable. The Company has never incurred material costs to defend lawsuits or settle claims related to these indemnification provisions. The Company has also entered into indemnification agreements with its directors and officers that require the Company, among other things, to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers to the fullest extent permitted by Delaware corporate law. The Company currently maintains directors' and officers' liability insurance that would generally enable it to recover a portion of any future amounts paid. The Company believes the estimated fair value of its indemnification agreements in excess of applicable insurance coverage is not material.

Legal Proceedings

From time to time, the Company may become involved in legal proceedings arising from the ordinary course of its business. If applicable, the Company records a legal liability when it believes that

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it is both probable that a liability may be imputed, and the amount of the liability can be reasonably estimated. Significant judgment by the Company is required to determine both probability and the estimated amount. As of December 31, 2019 and September 30, 2020 (unaudited), the Company does not believe that any such matters, individually or in the aggregate, will have a material adverse effect on the Company's financial position, results of operations or cash flows.

9. Income Taxes

The Company did not record any income tax expense during the years ended December 31, 2018 and 2019. The Company has a net operating loss and has provided a valuation allowance against net deferred tax assets due to uncertainties regarding the Company's ability to realize these assets. All losses before income taxes arose in the United States.

The effective tax rate of the Company's income tax expense (benefit) differs from the federal statutory rate as follows:

	December 31, 2018	December 31, 2019
Federal statutory income tax rate	21.0%	21.0%
Research tax credit	10.0%	5.2%
Permanent differences	(1.1%)	(0.7%)
Valuation allowance	(27.4%)	(25.5%)
Section 382 limitation	(2.5%)	0.0%
Provision for income taxes	<u>0.0%</u>	<u>0.0%</u>

The tax effects of temporary differences that give rise to significant components of the deferred taxes are as follows (in thousands):

	December 31, 2018	December 31, 2019
Deferred Tax Assets		
Net operating loss carryforwards	\$ 1,990	\$ 10,638
Other accrued liabilities	103	336
Deferred revenue	3,598	2,698
Research tax credits	1,872	4,457
Stock compensation	212	554
Intangible asset basis	—	1,591
Total deferred tax assets	<u>\$ 7,775</u>	<u>\$ 20,274</u>
Less: valuation allowance	<u>(7,775)</u>	<u>(20,274)</u>
Net deferred tax assets	<u>\$ —</u>	<u>\$ —</u>

ASC 740, *Income Taxes*, requires that the tax benefit of net operating losses, temporary differences and credit carryforwards be recorded as an asset to the extent that management assesses that realization is "more likely than not." Realization of the future tax benefits is dependent on the Company's ability to generate sufficient taxable income within the carryforward period. Because of the Company's recent history of operating losses, management believes that recognition of the deferred tax assets arising from future tax benefits is currently not likely to be realized and, accordingly, has provided a full valuation allowance. The valuation allowance increased by \$2.6 million and \$12.5 million during the years ended December 31, 2018 and 2019, respectively.

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The Company had net operating loss carryforwards of \$9.5 million and \$50.7 million as of December 31, 2018 and 2019, respectively, available to reduce future taxable income, if any, for federal income tax purposes. \$9.5 million of the federal net operating loss carryforwards expire in 2037 and the remaining \$41.2 million carryforward indefinitely.

As of December 31, 2018 and 2019, the Company had federal research and development credit carryforwards of \$1.3 million and \$3.3 million, respectively, and state research and development credit carryforwards of \$1.4 million and \$3.3 million, respectively, available to reduce future taxable income, if any, for federal and California state income tax purposes, respectively. The federal credit carryforwards begin expiring in 2035 and the state credits carryforward indefinitely.

Utilization of the net operating loss carryforwards and research credit carryforwards may be subject to an annual limitation due to the ownership percentage change limitations provided by the Internal Revenue Code and similar state provisions. Annual limitations may result in the expiration of the net operating losses (NOL) and tax credit carryforwards before they are utilized. The Company has experienced ownership changes in the past as a result of its Series B redeemable convertible preferred stock financing. As a result of the ownership changes, the Company has determined that \$0.9 million of its NOLs will expire unutilized for federal income tax purposes and such amounts are excluded from its NOLs as of December 31, 2019. Subsequent ownership changes may affect the limitation in future years.

The reconciliation of the beginning and ending unrecognized tax benefits amounts is as follows (in thousands):

	Unrecognized Income Tax Benefits
Balance as of December 31, 2017	\$ 352
Additions for current year tax positions	333
Reductions of prior year positions	(26)
Balance as of December 31, 2018	659
Additions for current year tax positions	907
Balance as of December 31, 2019	<u>\$ 1,566</u>

The entire amount of the unrecognized tax benefits would not impact the Company's effective tax rate if recognized. During each of the years ended December 31, 2018 and 2019, the Company did not recognize accrued interest and penalties related to unrecognized tax benefits. The Company does not anticipate that the amount of existing unrecognized tax benefits will materially increase or decrease during the next 12 months.

The Company files income tax returns in the U.S. federal and California tax jurisdictions. All tax returns from inception to December 31, 2019 remain subject to examination. The Company has no ongoing income tax examinations by tax authorities at this time.

10. Redeemable Convertible Preferred Stock

In August 2018, the Company issued 5,154,632 shares of Series B redeemable convertible preferred stock at \$17.46 per share for gross proceeds of \$90.0 million.

As of December 31, 2018 and 2019, the Company's certificate of incorporation authorized the Company to issue up to 7,375,638 shares of redeemable convertible preferred stock at a par value of \$0.0001 per share.

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In April and June of 2020, the Company issued a total of 4,200,353 shares of Series C redeemable convertible preferred stock at \$18.00 per share for gross proceeds of \$75.6 million (unaudited).

As of September 30, 2020, the Company's amended certificate of incorporation authorized the Company to issue up to 11,575,984 (unaudited) shares of redeemable convertible preferred stock at a par value of \$0.0001 per share.

Redeemable convertible preferred stock consists of the following as of December 31, 2018 and 2019 (in thousands, except per share and share amounts):

	Shares Authorized	Original Issuance Price	Shares Issued and Outstanding	Liquidation Value	Proceeds Net of Issuance Cost
Series A	909,312	\$ 7.70	909,312	\$ 7,001	\$ 6,960
Series A-1	1,311,687	\$ 8.84	1,311,687	11,595	11,548
Series B	5,154,639	\$ 17.46	5,154,632	90,000	84,472
Total	<u>7,375,638</u>		<u>7,375,631</u>	<u>\$ 108,596</u>	<u>\$ 102,980</u>

Redeemable convertible preferred stock consists of the following as of September 30, 2020 (unaudited) (in thousands, except per share and share amounts):

	Shares Authorized	Original Issuance Price	Shares Issued and Outstanding	Liquidation Value	Proceeds Net of Issuance Cost
Series A	909,312	\$ 7.70	909,312	\$ 7,001	\$ 6,960
Series A-1	1,311,687	\$ 8.84	1,311,687	11,595	11,548
Series B	5,154,632	\$ 17.46	5,154,632	90,000	84,472
Series C	4,200,353	\$ 18.00	4,200,353	75,606	72,468
Total	<u>11,575,984</u>		<u>11,575,984</u>	<u>\$ 184,202</u>	<u>\$ 175,448</u>

The holders of redeemable convertible preferred stock have various rights and preferences including the following:

Liquidation Preference—In the event of a liquidation event, the holders of the shares of Series C (unaudited) and Series B redeemable convertible preferred stock are entitled to receive any distribution of any of the assets of the Company in preference to the holders of the Series A-1 redeemable convertible preferred stock, Series A redeemable convertible preferred stock or common stock, an amount per share equal to the greater of (i) the sum of the original Series C (unaudited) issue price plus all declared but unpaid dividends thereon or the original Series B issue price plus all declared but unpaid dividends and (ii) such amount per share payable had all shares of Series C (unaudited) and Series B redeemable convertible preferred stock been converted into common stock. If upon the occurrence of a liquidation event, the available assets are insufficient to pay the holders of Series C and Series B redeemable convertible preferred stock the full amount to which they are entitled, then the available assets shall be distributed to the holders of the shares of Series C and Series B redeemable convertible preferred stock, in proportion to the full preferential amount each holder is otherwise entitled to receive (unaudited). After full payment to holders of the Series C (unaudited) and Series B redeemable convertible preferred stock, payment should be made to the holders of Series A-1 redeemable convertible preferred stock, in preference to the holders of the Series A redeemable convertible preferred stock or common stock, in an amount equal to the greater of (i) the original Series A-1 issue price plus all declared but unpaid dividends and (ii) such amount per share payable had all shares of Series A-1 redeemable convertible preferred stock been converted into common stock. After

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full payment to holders of the Series A-1 redeemable convertible preferred stock, payment should be made to the holders of Series A redeemable convertible preferred stock, in preference to the holders of the common stock, in an amount equal to the greater of (i) the original Series A issue price plus all declared but unpaid dividends and (ii) such amount per share payable had all shares of Series A redeemable convertible preferred stock been converted into common stock. If upon the occurrence of a liquidation event, the available assets are insufficient to pay the holders of Series A-1 or Series A redeemable convertible preferred stock the full amount to which they are entitled, then the available assets shall be distributed to the holders of such redeemable convertible preferred stock on a pro rata, on an equal priority, pari passu basis, in proportion to the full preferential amount such holder is otherwise entitled to receive (unaudited).

Notwithstanding the above, for purposes of determining the amount each holder of shares of redeemable convertible preferred stock is entitled to receive with respect to a Liquidation Event, each such holder of shares of a series of redeemable convertible preferred stock shall be deemed to have converted such holder's shares of such series into shares of common stock immediately prior to the Liquidation Event if, as a result of an actual conversion, such holder would receive, in the aggregate, an amount greater than the amount that would be distributed to such holder if such holder did not convert such series of redeemable convertible preferred stock into shares of common stock. If any such holder shall be deemed to have converted shares of redeemable convertible preferred stock into common stock pursuant to this paragraph, then such holder shall not be entitled to receive any distribution that would otherwise be made to holders of redeemable convertible preferred stock that have not converted into shares of common stock.

Conversion—Shares of any series of redeemable convertible preferred stock can be converted, at the option of the holder, into such number of fully paid and non-assessable shares of common stock using a conversion rate determined by dividing the applicable original issue price by the applicable conversion price, as adjusted for any anti-dilution adjustments. If, after the issuance date of the redeemable convertible preferred stock, the Company issues or sells, or is deemed to have sold, additional shares of common stock at a price lower than the relevant conversion price in effect, except for certain exceptions allowed, the conversion price of the redeemable convertible preferred stock would be adjusted. As of December 31, 2018 and 2019, the conversion price for the Series A, A-1 and B redeemable convertible preferred stock is \$7.700 per share, \$8.839 per share and \$17.460 per share, respectively, and the conversion ratio is one-for-one. As of September 30, 2020, the conversion price for the Series A, A-1, B and C redeemable convertible preferred stock is \$7.700 (unaudited) per share, \$8.839 (unaudited) per share, \$17.460 (unaudited) per share, and \$18.000 (unaudited) per share, respectively, and the conversion ratio is one-for-one.

As of December 31, 2018 and 2019, shares of redeemable convertible preferred stock shall automatically be converted into shares of common stock at the then effective conversion price for such share, immediately prior to either: (i) the completion of an underwritten public offering of the Company's common stock at a price of at least 1.5 times the original Series B issuance price for any initial public offering consummated at any time prior to the first anniversary of the Series B original issuance date, or 1.25 times the original Series B issuance price for any such IPO thereafter and that provides at least \$30.0 million of gross proceeds to the Company (a "Qualified IPO") or (ii) the conversion by the holders of redeemable convertible preferred stock, which requires the vote of the holders of a majority of the then outstanding shares of redeemable convertible preferred stock, voting together as a single class on an as-converted to common stock basis.

As of September 30, 2020 (unaudited), shares of redeemable convertible preferred stock shall automatically be converted into shares of common stock at the then effective conversion price for such share, immediately prior to either: (i) the completion of an underwritten public offering of the Company's common stock at a price of at least 1.25 times the original Series C issuance price, as adjusted for any

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stock splits, stock dividends, combinations, subdivisions, recapitalizations or the like that provides at least \$50.0 million of gross proceeds to the Company (a "Qualified IPO") or (ii) the conversion by the holders of redeemable convertible preferred stock, which requires the vote of the holders of a majority of the then outstanding shares of redeemable convertible preferred stock voting together as a single class on an as-converted to common stock basis; provided, however that any automatic conversion of the Series C and Series B redeemable convertible preferred stock under (ii) shall require the consent of the holders of a majority of Series C and Series B redeemable convertible preferred stock then outstanding voting together as a single class on an as-converted to common stock basis.

Dividends—Holders of shares of redeemable convertible preferred stock shall be entitled to non-cumulative dividends prior to, and in preference to any declaration or payment of any dividend on common stock. The amount of such dividends payable per share of preferred stock is at least equal to the dividend payable per share of common stock. Through December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited), no dividends had been declared. Given this dividend preference, the Company considers all series of redeemable convertible preferred stock to be participating securities.

Voting Rights—Each holder of redeemable convertible preferred stock shall be entitled to the number of votes equal to the number of shares of common stock into which the shares of redeemable convertible preferred stock held by such holder could be converted as of the record date. Holders of redeemable convertible preferred stock and common stock generally vote as a single class. So long as at least 777,778 shares of Series C redeemable convertible preferred stock issued remain outstanding, the holders of a majority of Series C redeemable convertible preferred stock will be entitled to designate one director (unaudited). So long as at least 916,380 of the Series B redeemable convertible preferred stock issued remain outstanding, the holders of a majority of the Series B redeemable convertible preferred stock will be entitled to designate one director. The holders of record of shares of Series A-1 redeemable convertible preferred stock, exclusively and as a separate class, shall be entitled to designate one director (unaudited).

Redemption and Balance Sheet Classification—The redeemable convertible preferred stock is recorded in mezzanine equity because while it is not mandatorily redeemable, it will become redeemable at the option of the stockholders upon the occurrence of a deemed liquidation event that is considered not solely within the Company's control.

Funding Agreement with CFF (unaudited)—In April 2020, the Cystic Fibrosis Foundation ("CFF") made a \$10.0 million investment in the Company's Series C redeemable convertible preferred stock financing. In return for the investment, CFF received shares of Series C redeemable convertible preferred stock, and the Company and CFF entered into a Funding Agreement ("the Funding Agreement"). Pursuant to the terms of the Funding Agreement, except in the event of a technical failure, the \$10.0 million received from CFF will be used to advance the development program for 4D-710, the Company's lead product in cystic fibrosis, or any other therapeutic approved by the Program Advisory Group ("PAG") to alleviate pulmonary complications of cystic fibrosis ("the Funding Agreement Product"). CFF is committed to provide an additional \$4.0 million of funding upon acceptance of an Investigational New Drug application or its equivalent to allow for human testing of the Funding Agreement Product ("Acceptance"), except in the event of a change of control transaction occurring prior to Acceptance or Acceptance occurring after April 29, 2026. If the Company's common stock is publicly traded at the time of Acceptance, CFF will receive shares of common stock priced at the 10-day average reported closing price of the Company's common stock on the date of Acceptance. If the Company's common stock is not publicly traded at the time of Acceptance, CFF will receive a convertible note ("Note"). The Note has a term of three years from date of issuance and carries an 8% interest rate per annum on the outstanding principal amount. All unpaid interest and principal shall be due and payable upon request of CFF on the third anniversary of the issuance of the Note. The Note

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shall automatically convert as follows: (i) into common stock at 85% of the public price per share, or (ii) into preferred shares at 85% of the lowest price per share paid by other investors in a secondary or private offering of the Company's preferred stock of more than \$25.0 million. If a conversion has not occurred after five hundred forty days from date of the Note issuance, CFF may elect to convert the principal amount of the Note plus accrued interest into Series C redeemable convertible preferred stock at a price per share of \$18.00 upon notice to the Company. Except in the event of a technical failure, the Company is committed to providing an amount equal to the funding provided by CFF to be used solely to advance the Funding Agreement Product. A technical failure is defined as a determination by the Company, after consultation with and approval of the PAG that (i) the Funding Agreement Product has failed to reach its intended endpoints due to safety issues, lack of sufficient transgene expression and/or efficacy, each despite commercially reasonable efforts and (ii) the exercise of further commercially reasonable efforts is unlikely to correct such failure. Under the terms of the Funding Agreement, neither the \$10.0 million investment in the Series C redeemable convertible preferred stock nor the \$4.0 million of funding upon Acceptance are restricted as to withdrawal or usage.

11. Common Stock

As of each of December 31, 2018 and 2019, the Company's certificate of incorporation authorized the Company to issue 50,000,000 shares of common stock at the par value of \$0.0001 per share. As of September 30, 2020, the Company's amended certificate of incorporation authorized the Company to issue 20,866,244 (unaudited) shares of common stock at the par value of \$0.0001 per share. The holder of each share of common stock is entitled to one vote per share.

Common stockholders are entitled to dividends if and when declared by the board of directors, subject to the prior rights of the redeemable preferred stockholders. As of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited), no dividends on common stock had been declared by the board of directors.

The number of authorized shares of common stock may be increased or decreased (but not below the number of shares thereof then outstanding or reserved for issuance) by the affirmative vote of the holders of a majority (assuming the conversion of all redeemable convertible preferred stock) of the capital stock of the Company entitled to vote and without a separate class vote of the common stock.

As of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited), the Company has reserved common stock, on an as-converted basis, for future issuance as follows:

	<u>December 31, 2018</u>	<u>December 31, 2019</u>	<u>September 30, 2020</u> (Unaudited)
Conversion of redeemable convertible preferred stock	7,375,631	7,375,631	11,575,984
Stock options available for future stock option grant	578,842	125,353	41,897
Options issued and outstanding	2,028,274	2,474,152	2,928,321
Common stock warrants	68,669	68,669	68,669
Total common stock reserved	<u>10,051,416</u>	<u>10,043,805</u>	<u>14,614,871</u>

Restricted Common Stock

During 2015, the Company issued common stock to the Company founders of 4,710,060 shares, of which 4,473,374 were fully vested upon issuance. The remainder were deemed to be restricted

based on their vesting conditions. The stock agreement contains certain provisions that allow the Company to repurchase unvested portions of stock from such founders in the event they depart from the Company. The repurchase rights on the restricted common stock lapsed over time and fully expired in March 2019. As of December 31, 2018, December 31, 2019 and September 30, 2020, 14,793, 0 and 0 (unaudited) shares of restricted common stock remained subject to repurchase, respectively.

12. Stock-based Compensation

2015 Equity Incentive Plan

In March 2015, the Company adopted the 2015 Equity Incentive Plan (the “2015 Plan”) under which the board of directors is authorized to issue grants of stock options, stock appreciation rights, restricted stock and restricted stock unit awards to employees, directors and consultants of the Company. As of December 31, 2018, December 31, 2019 and September 30, 2020, there were 2,694,528, 2,739,528 and 3,189,028 (unaudited) shares authorized and reserved for issuance, respectively. Under the 2015 Plan, as of December 31, 2018, December 31, 2019 and September 30, 2020, 578,842, 125,353 and 41,897 (unaudited) of these shares, respectively, were available for grant. All options are exercisable over a period not to exceed the contractual term of ten years from the date the stock options were issued and are granted at prices not less than the estimated fair market value of the Company’s common stock on the grant date as determined by the board of directors. If an individual owns stock representing more than 10% of the Company’s outstanding shares, the exercise price of each share shall be at least 110% of the fair market value on the date of grant.

Stock Options

The following table summarizes the stock options activity:

	Number of Shares Available for Grant	Options Outstanding		Weighted- Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
		Number of Shares Underlying Outstanding Options	Weighted- Average Exercise Price		
Balances at December 31, 2017	1,004,239	792,290	\$ 1.16	8.27	\$ 1,609
Options authorized	873,628	—	—		
Options granted	(1,454,173)	1,454,173	6.56		
Options exercised	—	(63,041)	1.66		488
Options expired	111,401	(111,401)	1.13		
Options forfeited	43,747	(43,747)	1.95		
Balances at December 31, 2018	578,842	2,028,274	\$ 5.00	8.97	\$ 8,939
Options authorized	45,000	—	—		
Options granted	(1,136,840)	1,136,840	10.04		
Options exercised	—	(52,611)	1.43		705
Options expired	72,833	(72,833)	1.80		
Options forfeited	565,518	(565,518)	8.15		
Balances at December 31, 2019	125,353	2,474,152	\$ 6.77	8.46	\$ 19,974
Options authorized (unaudited)	449,500	—	—		
Options granted (unaudited)	(822,743)	822,743	15.73		
Options exercised (unaudited)	—	(78,787)	7.07		859
Options expired (unaudited)	73,103	(73,103)	5.57		
Options forfeited (unaudited)	216,684	(216,684)	9.44		

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	Number of Shares Available for Grant	Options Outstanding		Weighted- Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
		Number of Shares Underlying Outstanding Options	Weighted- Average Exercise Price		
Balances at September 30, 2020 (unaudited)	<u>41,897</u>	<u>2,928,321</u>	\$ 9.11	8.26	\$ 25,949
Shares exercisable, December 31, 2019		928,864	\$ 3.63	7.42	\$ 10,414
Shares vested and expected to vest, December 31, 2019		2,474,152	\$ 6.77	8.46	\$ 19,974
Shares exercisable, September 30, 2020 (unaudited)		1,306,359	\$ 5.29	7.22	\$ 16,567
Shares vested and expected to vest, September 30, 2020 (unaudited)		<u>2,928,321</u>	\$ 9.11	8.26	\$ 25,949

The following table is a summary of stock compensation expense for employees and nonemployees by function (in thousands):

	Year Ended December 31, <u>2018</u>	Year Ended December 31, <u>2019</u>	Nine Months Ended September 30, 2019 (Unaudited)	Nine Months Ended September 30, 2020 (Unaudited)
Research and development	\$ 695	\$ 2,191	\$ 1,562	\$ 1,897
General and administrative	682	1,350	964	1,370
Total stock-based compensation	<u>\$ 1,377</u>	<u>\$ 3,541</u>	<u>\$ 2,526</u>	<u>\$ 3,267</u>

During the years ended December 31, 2018 and 2019, the Company granted 1,234,173 and 1,101,840 stock options to employees with a weighted-average grant date fair value of \$5.50 and \$8.46 per share, respectively, and 220,000 and 35,000 stock options to nonemployees with a weighted-average grant date fair value of \$3.38 and \$8.43 per share, respectively. During the nine months ended September 30, 2019 and 2020, the Company granted 1,000,740 (unaudited) and 768,743 (unaudited) stock options to employees with a weighted-average grant date fair value of \$8.30 (unaudited) and \$11.00 (unaudited) per share, respectively, and 35,000 (unaudited) and 54,000 (unaudited) stock options to nonemployees with a weighted-average grant date fair value of \$8.43 (unaudited) and \$11.05 (unaudited) per share, respectively. The total fair value of options vested during the years ended December 31, 2018 and 2019 was \$0.8 million and \$2.2 million, respectively, and \$1.5 million (unaudited) and \$4.0 million (unaudited) during the nine months ended September 30, 2019 and 2020, respectively. As of December 31, 2019 and September 30, 2020, the unrecognized stock-based compensation of unvested options was \$10.7 million and \$ 14.7 million (unaudited), respectively, and is expected to be recognized over a weighted-average period of 3.0 years and 3.0 years (unaudited), respectively.

Stock-based compensation expense recorded for employee options was \$0.6 million and \$2.8 million for the years ended December 31, 2018 and 2019 and \$1.9 million (unaudited) and \$2.9 million (unaudited) for the nine months ended September 30, 2019 and 2020, respectively. Stock-based compensation expense recorded for nonemployee consultants was \$0.8 million and \$0.7 million for years ended December 31, 2018 and 2019, respectively, and \$0.6 million (unaudited) and \$0.4 million (unaudited) for the nine months ended September 30, 2019 and 2020, respectively.

The Company is a privately held company with no active public market for the Company's common stock. The fair value of the shares of common stock underlying the stock options was

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estimated by the board of directors at various dates considering the Company's most recently available third-party valuations of common stock as well as a number of objective and subjective factors including valuation of comparable companies, sales of redeemable convertible preferred stock, operating and financial performance and general and industry specific economic outlook, amongst other factors. The fair value was determined in accordance with the guidance provided by the American Institute of Certified Public Accountants' Practice Guide, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation*.

The Company estimates the fair value of employee and nonemployee stock options using the Black-Scholes valuation model. The fair value of employee and nonemployee stock options is recognized on a straight-line basis over the requisite service period of the awards. The fair value of the Company's stock options was estimated using the following assumptions for the years ended December 31, 2018 and 2019 and nine months ended September 30, 2019 and 2020 (unaudited):

	Year Ended December 31, 2018		Year Ended December 31, 2019		Nine Months Ended September 30, 2019		Nine Months Ended September 30, 2020	
	Employee	Nonemployee	Employee	Nonemployee	Employee	Nonemployee	Employee	Nonemployee
Expected term	5.5 – 6.3 years	6.7 – 9.9 years	5.5 – 6.3 years	6.1 – 10.0 years	5.5 – 6.3 years	6.1 – 10.0 years	5.5 – 6.3 years	6.0 years
Expected volatility	81.4% – 84.1%	80.8% – 83.9%	81.9% – 83.0%	81.3% – 83.7%	81.9% – 83.0%	81.3% – 83.7%	82.1% – 83.8%	82.1% – 83.1%
Risk-free interest rate	2.7% – 3.0%	2.6% – 3.2%	1.5% – 2.3%	1.4% – 2.4%	1.9% – 2.3%	1.4% – 2.4%	0.4% – 0.7%	0.4% – 0.7%
Expected dividend yield	0%	0%	0%	0%	0%	0%	0%	0%

Expected Term. The expected term for employee options is calculated using the simplified method as the Company does not have sufficient historical information to provide a basis for estimate. The simplified method is based on the average of the vesting tranches and the contractual life of each grant. The expected term for nonemployee options is the contractual term of the options.

Expected Volatility. The expected volatility was estimated based on a study of publicly traded peer companies as the Company did not have any trading history for its common stock. The Company selected the peer group based on similarities in industry, stage of development, size and financial leverage with the Company's principal business operations. For each grant, the Company measured historical volatility over a period equivalent to the expected term.

Risk-free Interest Rate. The risk-free interest rate is based on the yield available on U.S. Treasury zero-coupon issues whose term is similar in duration to the expected term of the respective stock option.

Expected Dividend Yield. The Company has not paid and does not anticipate paying any dividends on its common stock in the future. Accordingly, the Company has estimated the dividend yield to be zero.

13. Common Stock Warrants

In 2016, the Company issued a warrant for 45,000 shares of the Company's common stock to a service provider with an exercise price of \$1.14 per share, of which 15,000 warrant shares become exercisable upon completion of an offering of securities in a private placement by the Company with net proceeds in excess of \$25.0 million and 30,000 warrant shares become exercisable upon completion of an IPO by the Company. As the services had been completed at the date the warrant had been issued, the fair value of the warrant was determined at the issuance date. In 2018, 15,000 of these warrant shares became exercisable upon the completion of the Series B financing and the \$13,000 fair value of these warrant shares, as determined under the Black-Scholes Model, was recorded within operating expenses in the statements of operations and comprehensive loss and within additional paid-in-capital in the balance sheets. The Company has not recognized expense for the remaining 30,000

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warrant shares that become exercisable upon completion of an IPO as the vesting condition was not considered probable as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited). If an IPO had occurred on December 31, 2019 or September 30, 2020 (unaudited), the Company would have recorded less than \$0.1 million within operating expenses in the statements of operations and comprehensive loss and within additional paid-in-capital in the balance sheets for the 30,000 warrant shares becoming exercisable. The warrant expires in 2023.

The Company also agreed to issue a warrant for 23,669 common stock shares with an exercise price of \$3.19 per share to a third party. As the Company had not issued the warrant as of December 31, 2017, the obligation to issue this common stock warrant was remeasured to its fair value of \$60,000 as of December 31, 2017 using the Black-Scholes option pricing model. The warrant was issued in May 2018 and the obligation to issue the common stock warrant was remeasured at the fair value of \$59,000 and recorded within additional paid-in-capital in the balance sheet upon issuance of the warrant. The warrant expires in 2025.

14. Net Loss Per Share Attributable to Common Stockholders

The following table sets forth the computation of basic and diluted net loss per share attributable to common stockholders (in thousands, except share and per share data):

	<u>Year Ended December 31, 2018</u>	<u>Year Ended December 31, 2019</u>	<u>Nine Months Ended September 30, 2019 (Unaudited)</u>	<u>Nine Months Ended September 30, 2020 (Unaudited)</u>
Numerator				
Net loss attributable to common stockholders	\$ (9,551)	\$ (49,306)	\$ (33,191)	\$ (36,146)
Denominator				
Weighted-average shares outstanding	5,090,988	5,143,776	5,137,248	5,188,628
Less: Weighted-average shares subject to repurchase used in computing net loss per share attributable to common stockholders, basic and diluted	(41,785)	(1,216)	(1,626)	—
Weighted-average shares outstanding used in computing net loss per share attributable to common stockholders, basic and diluted	<u>5,049,203</u>	<u>5,142,560</u>	<u>5,135,622</u>	<u>5,188,628</u>
Net loss per share attributable to common stockholders—basic and diluted	<u>\$ (1.89)</u>	<u>\$ (9.59)</u>	<u>\$ (6.46)</u>	<u>\$ (6.97)</u>

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The following outstanding shares of potentially dilutive securities were excluded from the computation of diluted net loss per share attributable to common stockholders for the period presented because including them would have been antidilutive:

	December 31, 2018	December 31, 2019	September 30, 2019 (Unaudited)	September 30, 2020 (Unaudited)
Redeemable convertible preferred stock	7,375,631	7,375,631	7,375,631	11,575,984
Options to purchase common stock	2,028,274	2,474,152	2,535,230	2,928,321
Unvested common stock subject to repurchase	14,793	—	—	—
Common stock warrant	68,669	68,669	68,669	68,669
Total	<u>9,487,367</u>	<u>9,918,452</u>	<u>9,979,530</u>	<u>14,572,974</u>

Unaudited Pro Forma Net Loss Per Share

Unaudited pro forma basic and diluted net loss per share were computed to give effect to the automatic one-for-one conversion of all outstanding shares of redeemable convertible preferred stock into shares of common stock in connection with the closing of the planned IPO, using the as-converted method as though the conversion had occurred as of the beginning of the period presented or the date of issuance, if later.

Unaudited pro forma basic and diluted loss per share is computed as follows (in thousands, except share and per share data):

	Year Ended December 31, 2019	Nine Months Ended September 30, 2020
Numerator		
Net loss used in computing pro forma net loss per share, basic and diluted	<u>\$ (49,306)</u>	<u>\$ (36,146)</u>
Denominator		
Weighted-average shares outstanding used in computing net loss per share, attributable to common stockholders, basic and diluted	5,142,560	5,188,628
Adjust: Conversion of redeemable convertible preferred stock	<u>7,375,631</u>	<u>9,646,715</u>
Weighted-average shares outstanding used in computing pro forma net loss per share, basic and diluted	<u>12,518,191</u>	<u>14,835,343</u>
Net loss per share, basic and diluted	<u>\$ (3.94)</u>	<u>\$ (2.44)</u>

15. Derivative Liability

The Company identified an embedded derivative resulting from the change of control provision in the CFFT Agreement. Embedded derivatives that are required to be bifurcated from the underlying host instrument are accounted for and valued as separate financial instruments. At the inception of the derivative in 2017, the Company recognized this derivative as a liability and revenue was reduced by the initial fair value of the derivative liability. The Company remeasures the derivative liability to fair value at each reporting period and records the change in fair value of the derivative liability as other income (expense), net. The Company uses a present value analysis with multiple scenarios, which incorporates assumptions and estimates to value the derivative instrument. The Company assesses these assumptions and estimates on a periodic basis as additional information impacting the assumptions is obtained. Estimates and assumptions impacting the fair value measurement include the change of control payment to CFFT (range of \$0 to \$10.6 million (unaudited) at September 30, 2020),

the probability of a change of control event, the probability of the product achieving development or commercial status at time of change of control (range of 3.4% to 12.3% (unaudited) at September 30, 2020) and the discount rate (20% (unaudited) at September 30, 2020). The Company determined the estimated fair value of this liability as of the inception date of the CFFT Agreement and concluded that the amount was immaterial. The Company determined the fair value of this derivative liability was \$0.1 million as of December 31, 2018, December 31, 2019 and September 30, 2020 (unaudited).

16. Related Party Transactions

In January 2014, in connection with the performance obligations under the uniQure Agreement, the founders of the Company received equity options to purchase an aggregate of 609,744 of uniQure ordinary shares that vest over the initial three-year term of the agreement and one of the founders of the Company agreed to serve as a director of uniQure.

In August 2019, the Company and uniQure entered into the amended uniQure Agreement and the Second uniQure Agreement. Under these agreements, the Company agreed to transfer incremental rights and services to uniQure in exchange for uniQure eliminating the exclusivity clause in the uniQure Agreement and transferring other rights back to the Company. Further details and the accounting for these agreements is discussed in Note 6. As of June 17, 2020, uniQure is no longer a related party of the Company (unaudited).

In 2015, the Company signed a collaboration and license agreement with Pfizer and recorded deferred revenue of \$5.0 million related to the upfront payment received from Pfizer under the arrangement. In 2018, Pfizer terminated this agreement for convenience. Upon the termination of the agreement, the Company recognized revenue on the \$5.0 million upfront payment. As of December 31, 2018 and 2019, Pfizer owns 1,474,992 shares of the Company's redeemable convertible preferred stock, and as of September 30, 2020, Pfizer owns 1,641,658 (unaudited) shares of the Company's redeemable convertible preferred stock and has a representative director on the Company's board of directors.

In the years ended December 31, 2018 and 2019 and the nine months ended September 30, 2019 and 2020, the Company paid \$50,000, \$52,000, \$37,500 (unaudited) and \$37,500 (unaudited), respectively, to David Schaffer, PhD, the co-founder and Chief Scientific Advisor of the Company for consulting services. In April 2019, the Company entered into two sponsored research agreements ("SRAs") with the UC Regents to conduct research in a research facility on the Berkeley campus, under the direction of Dr. Schaffer. The SRAs have a three year term ending in May 2022. Under the SRAs, the Company has an option to license (on a royalty-bearing basis) all intellectual property generated under the SRAs. The total amount the Company is committed to pay to the UC Regents under the SRAs is \$1.5 million, of which \$0.4 million was paid upon the execution of the SRAs. In the years ended December 31, 2018 and 2019 and the nine months ended September 30, 2019 and 2020, the Company recorded \$0, \$0.3 million, \$0.2 million (unaudited) and \$0.4 million (unaudited), respectively, of expense related to SRAs. Any patent prosecution costs incurred under the SRAs will also be borne by the Company. The Company can terminate the SRAs for convenience and without cause with 60 days' notice.

In 2016, the Company entered into a consulting agreement with one of its former directors, who resigned as a director in December 2018, to provide business development strategy services. In connection with this agreement, the former director was granted stock options. In the year ended December 31, 2018, the Company recorded \$219,500 of stock-based compensation expense related to such stock options.

In 2016, the Chief Executive Officer and several other employees of the Company founded Ignite Immunotherapy ("Ignite"). From 2016 through October 2019, the Company's Chief Executive Officer served as the Chief Executive Officer and Executive Chairman of Ignite and certain executives of the

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Company held ownership interests in Ignite and were members of the board of directors of Ignite. Additionally, during this time period, Pfizer, which is a related party of the Company, held a significant equity stake in Ignite. There were no transactions between the Company and Ignite from 2016 to October 2019. As of October 18, 2019, Ignite is no longer a related party of the Company.

17. Subsequent Events

The Company evaluated subsequent events through June 19, 2020, the date on which the financial statements were available for issuance. The Company also evaluated subsequent events through October 14, 2020, the date on which the financial statements were available for reissuance.

In April and June of 2020, the Company entered into a Series C Preferred Stock Purchase Agreement, pursuant to which the Company issued and sold 4,200,353 shares of its Series C redeemable convertible preferred stock at a purchase price of \$18.00 per share for gross proceeds of \$75.6 million (net proceeds of \$72.5 million).

In connection with the closing of this financing, the Company amended and restated its certificate of incorporation to, among other things, (i) decrease the number of shares of common stock that the Company is authorized to issue to an aggregate of 20,866,244 shares, (ii) increase the number of shares of preferred stock that the Company is authorized to issue to an aggregate of 11,575,984 shares, of which 4,200,353 shares shall be designated Series C redeemable convertible preferred stock (iii) establish that the holders of the Series C redeemable convertible preferred stock are entitled to receive dividends, if and when declared by the Board of Directors, at least equal to the dividend payable per share of common stock, (iv) establish that in the event of a liquidation event, the holders of the Series B and Series C redeemable convertible preferred stock are entitled to receive any distribution of any of the assets of the Company in preference to the holders of the Series A-1 redeemable convertible preferred stock, Series A redeemable convertible preferred stock or common stock, an amount per share equal to the greater of (i) the original issue price plus all declared but unpaid dividends and (ii) such amount per share payable had all shares of Series B and Series C redeemable convertible preferred stock been converted into common stock, (v) provide that each share of Series A, Series A-1, Series B and Series C redeemable convertible preferred stock shall automatically be converted to shares of common stock at the then-effective conversion rate upon the closing of a firm-commitment underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, provided that the offering price per share is not less than \$22.50 (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to common stock) and the gross cash proceeds to the Company are at least \$50.0 million, (vi) provide that each share of Series A, Series A-1, Series B and Series C redeemable convertible preferred stock shall be converted to shares of common stock at the then-effective conversion rate on the date and time, or the occurrence of an event, specified by vote or written consent of the holders of a majority of the preferred stock outstanding, voting together as a single class; provided, however, that any conversion of Series B and Series C redeemable convertible preferred stock shall require the consent of the majority of the Series B and Series C redeemable convertible preferred stock outstanding, voting together as a single class and (vii) establish other rights, preferences and privileges of the Series C redeemable convertible preferred stock.

CFF purchased \$10.0 million of Series C redeemable convertible preferred stock. Except in the event of a technical failure, the \$10.0 million received from CFF will be used to advance the development program for 4D-710, the Company's lead product in the lung therapeutic area, or any other therapeutic approved by the Program Advisory Group (PAG) to alleviate pulmonary complications of cystic fibrosis (the CF Product). CFF is committed to provide an additional \$4.0 million of funding upon acceptance of Investigational New Drug (IND) application or its equivalent to allow for

human testing of the CF Product, except in the event of a change of control transaction occurring prior to IND acceptance by a regulatory authority or IND acceptance occurring after April 29, 2026. Except in the event of a technical failure, the Company is committed to providing an amount equal to the funding provided by CFF to be used solely to advance the development program. A technical failure is defined as a determination by the Company, after consultation with and approval of the PAG that i) the CF Product has failed to reach its intended endpoints due to safety issues, lack of sufficient transgene expression and/or efficacy, each despite commercially reasonable efforts and ii) the exercise of further commercially reasonable efforts is unlikely to correct such failure.

In April 2020, the Company achieved a \$5.0 million milestone for the first filing of an IND with a good manufacturing practice lot with no clinical hold for the choroideremia program, pursuant to the 2017 Roche Agreement. The Company received the cash payment from Roche in June 2020.

18. Subsequent Events (unaudited)

The Company has evaluated subsequent events from October 1, 2020 through November 17, 2020, the date the unaudited interim financial statements were available for issuance.

From October 1, 2020 through November 17, 2020, the Company granted options for the purchase of 499,000 shares of common stock at an exercise price of \$18.66 per share. These options vest over a period of three to four years.

In November 2020, the Company's board of directors approved an amendment to the 2015 Equity Incentive Plan to increase the number of shares reserved for issuance by 1,000,000 shares.

Events Subsequent to Original Issuance of Unaudited Interim Financial Statements

In December 2020, the Company issued a warrant for 30,000 shares of the Company's common stock to a service provider with an exercise price of \$18.00 per share. This warrant vests over a period of four years.

Shares

4D Molecular Therapeutics, Inc.

Common Stock



Goldman Sachs & Co. LLC

BofA Securities

Evercore ISI

Through and including _____, 2020 (the 25th day after the date of this prospectus), all dealers effecting transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to a dealer's obligation to deliver a prospectus when acting as an underwriter and with respect to an unsold allotment or subscription.

PART II INFORMATION NOT REQUIRED IN PROSPECTUS**Item 13. Other Expenses of Issuance and Distribution.**

The following table sets forth the costs and expenses, other than the underwriting discounts and commissions, payable by the registrant in connection with the sale of common stock being registered. All amounts are estimates except for the SEC registration fee, the Financial Industry Regulatory Authority, Inc. (FINRA) filing fee and The Nasdaq Global Market listing fee.

Item	Amount paid or to be paid
SEC registration fee	\$ 10,910
FINRA filing fee	11,750
The Nasdaq Global Market listing fee	250,000
Printing and engraving expenses	400,000
Legal fees and expenses	1,900,000
Accounting fees and expenses	450,000
Blue Sky, qualification fees and expenses	35,000
Transfer Agent fees and expenses	6,000
Miscellaneous fees and expenses	36,340
Total	<u>\$ 3,100,000</u>

* To be completed by amendment.

Item 14. Indemnification of Directors and Officers.

As permitted by Section 102 of the Delaware General Corporation Law, we have adopted provisions in our amended and restated certificate of incorporation and amended and restated bylaws, to be in effect immediately prior to the consummation of this offering, that will limit or eliminate the personal liability of our directors for a breach of their fiduciary duty of care as a director. The duty of care generally requires that, when acting on behalf of the corporation, directors exercise an informed business judgment based on all material information reasonably available to them. Consequently, a director will not be personally liable to us or our stockholders for monetary damages for breach of fiduciary duty as a director, except for liability for:

- any breach of the director's duty of loyalty to us or our stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- any act related to unlawful stock repurchases, redemptions or other distributions or payment of dividends; or
- any transaction from which the director derived an improper personal benefit.

These limitations of liability do not affect the availability of equitable remedies such as injunctive relief or rescission. Our amended and restated certificate of incorporation will also authorize us to indemnify our officers, directors and other agents to the fullest extent permitted under Delaware law.

As permitted by Section 145 of the Delaware General Corporation Law, our amended and restated bylaws will provide that:

- we may indemnify our directors, officers, and employees to the fullest extent permitted by the Delaware General Corporation Law, subject to limited exceptions;

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- we may advance expenses to our directors, officers and employees in connection with a legal proceeding to the fullest extent permitted by the Delaware General Corporation Law, subject to limited exceptions; and
- the rights provided in our amended and restated bylaws are not exclusive.

Our amended and restated certificate of incorporation, to be attached as Exhibit 3.2 hereto, and our amended and restated bylaws, to be attached as Exhibit 3.4 hereto, will provide for the indemnification provisions described above and elsewhere herein. We have entered into separate indemnification agreements with our directors and officers which may be broader than the specific indemnification provisions contained in the Delaware General Corporation Law. These indemnification agreements generally require us, among other things, to indemnify our officers and directors against liabilities that may arise by reason of their status or service as directors or officers, other than liabilities arising from willful misconduct. These indemnification agreements also generally require us to advance any expenses incurred by the directors or officers as a result of any proceeding against them as to which they could be indemnified. In addition, we have purchased a policy of directors' and officers' liability insurance that insures our directors and officers against the cost of defense, settlement or payment of a judgment in some circumstances. These indemnification provisions and the indemnification agreements may be sufficiently broad to permit indemnification of our officers and directors for liabilities, including reimbursement of expenses incurred, arising under the Securities Act.

The form of Underwriting Agreement, to be attached as Exhibit 1.1 hereto, provides for indemnification by the underwriters of us and our officers who sign this Registration Statement and directors for specified liabilities, including matters arising under the Securities Act.

Item 15. Recent Sales of Unregistered Securities.

The following list sets forth information as to all securities we have sold since January 1, 2017, which were not registered under the Securities Act.

1. In May 2018, we issued a warrant to purchase 23,669 shares of our common stock at a per share exercise price of \$3.19.
2. In August 2018, we issued in a series of transactions an aggregate of 5,154,632 shares of our Series B redeemable convertible preferred stock at a price per share of \$17.46 for aggregate proceeds to us of \$89,999,874.72.
3. In April through June 2020, we issued, in a series of transactions an aggregate of 4,200,353 shares of our Series C redeemable convertible preferred stock at a price per share of \$18.00 for aggregate gross proceeds to us of \$75,606,354.00.
4. We granted stock options and stock awards to employees, directors and consultants under our 2015 Equity Incentive Plan, covering 4,075,756 shares of common stock, at a weighted-average exercise price of \$10.66 per share. Of these, options covering an aggregate of 928,968 shares of common stock were cancelled without being exercised.
5. In December 2020, we issued a warrant to purchase 30,000 shares of our common stock at a per share exercise price of \$18.00.

We claimed exemption from registration under the Securities Act for the sale and issuance of securities in the transactions described in paragraphs (1) through (3) by virtue of Section 4(a)(2) and/or Regulation D promulgated thereunder as transactions not involving any public offering. All of the purchasers of unregistered securities for which we relied on Section 4(a)(2) and/or Regulation D represented that they were accredited investors as defined under the Securities Act. We claimed such exemption on the basis that (a) the purchasers in each case represented that they intended to acquire the securities for investment only and not with a view to the distribution thereof and that they either received adequate information about the registrant or had access, through employment or other

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relationships, to such information and (b) appropriate legends were affixed to the stock certificates issued in such transactions.

We claimed exemption from registration under the Securities Act for the sales and issuances of securities in the transactions described in paragraph (4) above under Section 4(a)(2) of the Securities Act in that such sales and issuances did not involve a public offering or under Rule 701 promulgated under the Securities Act, in that they were offered and sold either pursuant to written compensatory plans or pursuant to a written contract relating to compensation, as provided by Rule 701.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits.

<u>Exhibit Number</u>	<u>Exhibit Description</u>
1.1	Form of Underwriting Agreement.
3.1†	Amended and Restated Certificate of Incorporation, currently in effect.
3.2	Form of Amended and Restated Certificate of Incorporation, to be in effect immediately prior to the consummation of this offering.
3.3†	Bylaws, currently in effect.
3.4	Form of Amended and Restated Bylaws, to be in effect immediately prior to the consummation of this offering.
4.1	Reference is made to exhibits 3.1 through 3.4.
4.2	Form of Common Stock Certificate.
4.3	Amended and Restated Investors' Rights Agreement, dated as of April 29, 2020, among the Registrant and the investors party thereto.
5.1	Opinion of Latham & Watkins LLP.
10.1(a)##†	2015 Equity Incentive Plan.
10.1(b)##†	Form of Stock Option Agreement under 2015 Equity Incentive Plan.
10.2(a)#	2020 Incentive Award Plan.
10.2(b)#	Form of Stock Option Grant Notice and Stock Option Agreement under the 2020 Incentive Award Plan.
10.2(c)#	Form of Restricted Stock Award Grant Notice and Restricted Stock Award Agreement under the 2020 Incentive Award Plan.
10.2(d)#	Form of Restricted Stock Unit Award Grant Notice and Restricted Stock Unit Award Agreement under the 2020 Incentive Award Plan.
10.3#	2020 Employee Stock Purchase Plan.
10.4	Form of Indemnification Agreement for directors and officers.
10.5††	Collaboration and License Agreement, dated November 16, 2017, among the Registrant, F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc.
10.6††	Amended and Restated Collaboration and License Agreement, dated August 6, 2019, between the Registrant and uniQure biopharma B.V.
10.7††	Collaboration and License Agreement, dated August 6, 2019, by and between the Registrant and uniQure biopharma B.V.
10.8†	Exclusive License and Bailment Agreement, dated December 19, 2013, between the Registrant and The Regents of the University of California.

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<u>Exhibit Number</u>	<u>Exhibit Description</u>
10.9†	Exclusive License and Bailment Agreement, dated December 19, 2013, between the Registrant and The Regents of the University of California.
10.10#	Offer Letter, dated March 20, 2015 between David Kirn, M.D. and the Registrant.
10.11#	Employment Agreement, dated January 15, 2019 between Peter Francis, M.D., Ph.D. and the Registrant.
10.12#	Offer Letter, dated January 4, 2019 between August Moretti and the Registrant.
23.1	Consent of independent registered public accounting firm.
23.2	Consent of Latham & Watkins LLP (included in Exhibit 5.1).
24.1	Power of Attorney. Reference is made to the signature page to the Registration Statement.

‡ Previously filed

* To be filed by amendment.

† Certain confidential portions (indicated by brackets and asterisks) have been omitted from this exhibit.

Indicates management contract or compensatory plan.

- (b) Financial Statement Schedules. All financial statement schedules are omitted because the information required to be set forth therein is not applicable or is shown in the financial statements or the notes thereto.

Item 17. Undertakings.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the Registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act, and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer, or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question of whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

The undersigned Registrant hereby undertakes that:

1. For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this Registration Statement in reliance upon Rule 430A and contained in a form of prospectus filed by the Registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this Registration Statement as of the time it was declared effective.
2. For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

The undersigned Registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant has duly caused this Registration Statement on Form S-1 to be signed on its behalf by the undersigned, thereunto duly authorized, in Emeryville, California on December 7, 2020.

4D Molecular Therapeutics, Inc.

By: /s/ David Kirn
David Kirn, M.D.
Chief Executive Officer

Pursuant to the requirements of the Securities Act, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ David Kirn</u> David Kirn, M.D.	Chief Executive Officer and Director (Principal Executive Officer)	December 7, 2020
<u>/s/ August J. Moretti</u> August J. Moretti	Chief Financial Officer (Principal Financial and Accounting Officer)	December 7, 2020
<u>*</u> John F. Milligan, Ph.D.	Executive Chairman	December 7, 2020
<u>*</u> William Burkoth	Director	December 7, 2020
<u>*</u> Jacob Chacko, M.D.	Director	December 7, 2020
<u>*</u> Susannah Gray	Director	December 7, 2020
<u>*</u> Nancy Miller-Rich	Director	December 7, 2020
<u>*</u> David Schaffer, Ph.D.	Director	December 7, 2020
<u>*</u> Charles P. Theuer, M.D., Ph.D.	Director	December 7, 2020
<u>*</u> Shawn Cline Tomasello, MBA	Director	December 7, 2020
<u>*</u> Tony Yao, M.D., Ph.D.	Director	December 7, 2020

*By: /s/ David Kirn
Attorney-in-fact

4D Molecular Therapeutics, Inc.
Common Stock, par value \$0.0001 per share

Underwriting Agreement

[●], 2020

Goldman Sachs & Co. LLC
BofA Securities, Inc.
Evercore Group L.L.C.

As representatives (the “Representatives”) of the several Underwriters named in Schedule I hereto

c/o Goldman Sachs & Co. LLC
200 West Street
New York, New York 10282

c/o BofA Securities, Inc.
One Bryant Park
New York, New York 10036

c/o Evercore Group L.L.C.
55 East 52nd Street
New York, New York 10055

Ladies and Gentlemen:

4D Molecular Therapeutics, Inc., a Delaware corporation (the “Company”), proposes, subject to the terms and conditions stated in this agreement (this “Agreement”), to issue and sell to the several Underwriters named in Schedule I hereto (the “Underwriters”) for whom you are acting as representatives (the “Representatives”) an aggregate of [●] shares (the “Firm Shares”) and, at the election of the Underwriters, up to [●] additional shares (the “Optional Shares”) of common stock, par value \$0.0001 per share (“Stock”), of the Company (the Firm Shares and the Optional Shares that the Underwriters elect to purchase pursuant to Section 2 hereof being collectively called the “Shares”). In the event that the Company has a single subsidiary or does not have any subsidiaries, then all references herein to “subsidiaries” of the Company shall be deemed to refer to such single subsidiary or to the Company, respectively, *mutatis mutandis*.

1. The Company represents and warrants to, and agrees with, each of the Underwriters that:

(a) A registration statement on Form S-1 (File No. 333-234021) (the “Initial Registration Statement”) in respect of the Shares has been filed with the Securities and Exchange Commission (the “Commission”); the Initial Registration Statement and any post-effective amendment thereto, each in the form heretofore delivered to you, have been declared effective by the Commission in such form; other than a registration statement, if any, increasing the size of the offering (a “Rule 462(b) Registration Statement”), filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended (the “Act”), which became effective upon filing, no other document with respect to the Initial Registration Statement has been filed with the Commission; and no stop order suspending the effectiveness of the Initial Registration Statement, any post-effective amendment thereto or the Rule 462(b) Registration Statement, if any, has been issued and no proceeding for that purpose or pursuant to Section 8A of the Act has been initiated or, to the Company’s knowledge, threatened by the Commission (any preliminary prospectus included in the Initial Registration Statement or filed with the Commission pursuant to Rule 424(a) of the rules and regulations of the Commission under the Act is hereinafter called a “Preliminary Prospectus”; the various parts of the Initial Registration Statement and the Rule 462(b) Registration Statement, if any, including all exhibits thereto and including the information contained in the form of final prospectus filed with the Commission pursuant to Rule 424(b) under the Act in accordance with Section 5(a) hereof and deemed by virtue of Rule 430A under the Act to be part of the Initial Registration Statement at the time it was declared effective, each as amended at the time such part of the Initial Registration Statement became effective or such part of the Rule 462(b) Registration Statement, if any, became or hereafter becomes effective, are hereinafter collectively called the “Registration Statement”; the Preliminary Prospectus relating to the Shares that was included in the Registration Statement immediately prior to the Applicable Time (as defined in Section 1(c) hereof) is hereinafter called the “Pricing Prospectus”; such final prospectus, in the form first filed pursuant to Rule 424(b) under the Act, is hereinafter called the “Prospectus”; any oral or written communication with potential investors undertaken in reliance on Section 5(d) of the Act or Rule 163B under the Act is hereinafter called a “Testing-the-Waters Communication”; any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Act is hereinafter called a “Written Testing-the-Waters Communication”; and any “issuer free writing prospectus” as defined in Rule 433 under the Act relating to the Shares is hereinafter called an “Issuer Free Writing Prospectus”); and any “bona fide electronic road show” as defined in Rule 433(h) (5) under the Act that has been made available without restriction to any person is hereinafter called a “broadly available road show”;

(b) (A) No order preventing or suspending the use of any Preliminary Prospectus or any Issuer Free Writing Prospectus has been issued by the Commission, and (B) each Preliminary Prospectus, at the time of filing thereof, conformed in all material respects to the requirements of the Act and the rules and regulations of the Commission thereunder, and did not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading; *provided, however*, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information (as defined in Section 9(b) of this Agreement);

(c) For the purposes of this Agreement, the “Applicable Time” is [●] p.m., New York City time on the date of this Agreement. The Pricing Prospectus, as supplemented by the information listed on Schedule II(c) hereto, taken together (collectively, the “Pricing Disclosure Package”), as of the Applicable Time, did not, and as of each Time of Delivery (as defined in Section 4(a) of this Agreement) (as supplemented by any post-effective amendment thereto) will not, include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; and each Issuer Free Writing Prospectus and each Written Testing-the-Waters Communication does not conflict with the information contained in the Registration Statement, the Pricing Prospectus or the Prospectus and each Issuer Free Writing Prospectus, each broadly available road show (if any) and each Written Testing-the-Waters Communication, as supplemented by and taken together with the Pricing Disclosure Package, as of the Applicable Time, did not, and as of each Time of Delivery (as supplemented by any post-effective amendment thereto) will not, include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that this representation and warranty shall not apply to statements or omissions made in reliance upon and in conformity with the Underwriter Information;

(d) The Registration Statement conforms, and the Prospectus and any further amendments or supplements to the Registration Statement and the Prospectus will conform, in all material respects to the requirements of the Act and the rules and regulations of the Commission thereunder and do not and will not, as of the applicable effective date as to each part of the Registration Statement, as of the applicable filing date as to the Prospectus and any amendment or supplement thereto, and as of each Time of Delivery, contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information;

(e) Neither the Company nor any of its subsidiaries has, since the date of the latest audited financial statements included in the Pricing Disclosure Package and the Prospectus, (i) sustained any material loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree or (ii) entered into any transaction or agreement (whether or not in the ordinary course of business) that is material to the Company and its subsidiaries, taken as a whole, or incurred any liability or obligation, direct or contingent, that is material to the Company and its subsidiaries, taken as a whole, in each case otherwise than as set forth or contemplated in the Pricing Disclosure Package and the Prospectus; and, since the respective dates as of which information is given in the Registration Statement and the Pricing Disclosure

Package and the Prospectus, there has not been (x) any change in the capital stock (other than as a result of (i) the exercise, if any, of stock options or the award, if any, of stock options or restricted stock in the ordinary course of business pursuant to the Company's equity plans that are described in the Pricing Disclosure Package and the Prospectus or (ii) the issuance, if any, of stock upon conversion of Company securities as described in the Pricing Disclosure Package and the Prospectus) or long-term debt of the Company or any of its subsidiaries or (y) any Material Adverse Effect (as defined below); as used in this Agreement, "Material Adverse Effect" shall mean a material adverse change or effect, or any development involving a prospective material adverse change or effect, in or affecting (i) the business, properties, general affairs, management, financial position, stockholders' equity, prospects or results of operations of the Company and its subsidiaries, taken as a whole or (ii) the ability of the Company to perform its obligations under this Agreement, including the issuance and sale of the Shares, or to consummate the transactions contemplated in the Pricing Disclosure Package and the Prospectus;

(f) The Company and its subsidiaries do not own any real property and have good and marketable title to all personal property owned by them (other than with respect to Intellectual Property (as defined below), which is addressed exclusively in subsection (aa) below), in each case free and clear of all liens, encumbrances and defects except such as are described in the Pricing Disclosure Package and the Prospectus or such as do not materially affect the value of such property and do not interfere with the use made and proposed to be made of such property by the Company and its subsidiaries; and any real property and buildings held under lease by the Company and its subsidiaries are held by them under valid, subsisting and enforceable leases with such exceptions as are not material and do not materially interfere with the use made and proposed to be made of such property and buildings by the Company and its subsidiaries;

(g) Each of the Company and its subsidiaries has been (i) duly organized and is validly existing and in good standing under the laws of its jurisdiction of organization, with power and authority (corporate and other) to own its properties and conduct its business as described in the Pricing Disclosure Package and the Prospectus, and (ii) duly qualified as a foreign corporation for the transaction of business and is in good standing (where such concept exists) under the laws of each other jurisdiction in which it owns or leases properties or conducts any business so as to require such qualification, except, in the case of this clause (ii), where the failure to be so qualified or in good standing would not, individually or in the aggregate, have a Material Adverse Effect, and each subsidiary of the Company has been listed in the Registration Statement;

(h) The Company has no subsidiaries;

(i) The Company has an authorized capitalization as set forth in the Pricing Disclosure Package and the Prospectus and all of the issued shares of capital stock of the Company have been duly and validly authorized and issued and are fully paid and non-assessable and conform in all material respects to the description of the Stock contained in the Pricing Disclosure Package and Prospectus;

(j) The Shares to be issued and sold by the Company to the Underwriters hereunder have been duly and validly authorized and, when issued and delivered against payment therefor as provided herein, will be duly and validly issued and fully paid and non-assessable and will conform in all material respects to the description of the Stock contained in the Pricing Disclosure Package and the Prospectus; and the issuance of the Shares is not subject to any preemptive or similar rights that have not been complied with or otherwise effectively waived;

(k) The issue and sale of the Shares and the compliance by the Company with this Agreement and the consummation of the transactions contemplated in this Agreement and the Pricing Disclosure Package and the Prospectus will not conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, (A) any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company or any of its subsidiaries is a party or by which the Company or any of its subsidiaries is bound or to which any of the property or assets of the Company or any of its subsidiaries is subject, (B) the certificate of incorporation or by-laws (or other applicable organizational document) of the Company or any of its subsidiaries, or (C) any statute or any judgment, order, rule or regulation of any court or governmental agency or body having jurisdiction over the Company or any of its subsidiaries or any of their properties, except, in the case of clauses (A) or (C), for such defaults, breaches, or violations that would not, individually or in the aggregate, have a Material Adverse Effect; and no consent, approval, authorization, order, registration or qualification of or with any such court or governmental agency or body is required for the issue and sale of the Shares or the consummation by the Company of the transactions contemplated by this Agreement, except such as have been obtained under the Act, the approval by the Financial Industry Regulatory Authority (“FINRA”) of the underwriting terms and arrangements and such consents, approvals, authorizations, registrations or qualifications as may be required under state securities or Blue Sky laws in connection with the purchase and distribution of the Shares by the Underwriters;

(l) Neither the Company nor any of its subsidiaries is (i) in violation of its certificate of incorporation or by-laws (or other applicable organizational document), (ii) in violation of any statute or any judgment, order, rule or regulation of any court or governmental agency or body having jurisdiction over the Company or any of its subsidiaries or any of their properties, or (iii) in default in the performance or observance of any obligation, agreement, covenant or condition contained in any indenture, mortgage, deed of trust, loan agreement, lease or other agreement or instrument to which it is a party or by which it or any of its properties may be bound, except, in the case of the foregoing clauses (ii) and (iii), for such defaults as would not, individually or in the aggregate, have a Material Adverse Effect;

(m) The statements set forth in the Pricing Disclosure Package and Prospectus under the captions “Description of Capital Stock” and “Shares Eligible for Future Sale”, insofar as they purport to constitute a summary of the terms of the Stock, under the caption “Material U.S. Federal Income Tax Consequences to Non-U.S. Holders”, and under the caption “Underwriting”, insofar as they purport to describe the provisions of the laws and documents referred to therein, are accurate, complete and fair in all material respects;

(n) Other than as set forth in the Pricing Disclosure Package and the Prospectus, there are no legal or governmental proceedings pending to which the Company or any of its subsidiaries, to the Company's knowledge, any officer or director of the Company, is a party or of which any property of the Company or any of its subsidiaries, is the subject which, if determined adversely to the Company or any of its subsidiaries (or such officer or director), would individually or in the aggregate have a Material Adverse Effect; and, to the Company's knowledge, no such proceedings are threatened or contemplated by governmental authorities or others;

(o) The Company is not and, after giving effect to the offering and sale of the Shares and the application of the proceeds thereof as described in the Pricing Disclosure Package and the Prospectus, will not be an "investment company", as such term is defined in the Investment Company Act of 1940, as amended (the "Investment Company Act");

(p) At the time of filing the Initial Registration Statement and any post-effective amendment thereto, at the earliest time thereafter that the Company or any offering participant made a bona fide offer (within the meaning of Rule 164(h)(2) under the Act) of the Shares, and at the date hereof, the Company was not and is not an "ineligible issuer," as defined under Rule 405 under the Act;

(q) PricewaterhouseCoopers LLP, who have certified certain financial statements of the Company and its subsidiaries, are independent public accountants as required by the Act and the rules and regulations of the Commission thereunder;

(r) The Company maintains a system of internal control over financial reporting (as such term is defined in Rule 13a-15(f) under the Securities Exchange Act of 1934, as amended (the "Exchange Act")) that (i) has been designed by the Company's principal executive officer and principal financial officer, or under their supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and (ii) is designed to provide reasonable assurance that (A) transactions are executed in accordance with management's general or specific authorization, (B) transactions are recorded as necessary to permit preparation of financial statements in conformity with generally accepted accounting principles and to maintain accountability for assets, (C) access to assets is permitted only in accordance with management's general or specific authorization and (D) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences. The Company is not aware of any material weaknesses in its internal control over financial reporting (it being understood that this subsection shall not require the Company to comply with Section 404 of the Sarbanes Oxley Act of 2002 as of an earlier date than it would otherwise be required to so comply under applicable law);

(s) Since the date of the latest audited financial statements included in the Pricing Disclosure Package and the Prospectus, there has been no change in the Company's internal control over financial reporting that has materially and adversely affected, or is reasonably likely to materially and adversely affect, the Company's internal control over financial reporting;

(t) The Company maintains disclosure controls and procedures (as such term is defined in Rule 13a-15(e) under the Exchange Act) have been designed to ensure that material information relating to the Company and its subsidiaries is made known to the Company's principal executive officer and principal financial officer by others within these entities; and such disclosure controls and procedures are effective at the reasonable assurance level;

(u) This Agreement has been duly authorized, executed and delivered by the Company;

(v) Neither the Company nor any director, officer, or to the knowledge of the Company, any employee, agent, affiliate or other person associated with or acting on behalf of the Company has (i) directly or indirectly made, offered, promised or authorized any unlawful payment, contribution, gift, entertainment or other unlawful benefit or expense to any government official, including any officer or employee of a government or government-owned or controlled entity or of a public international organization, or any person acting in an official capacity for or on behalf of any of the foregoing, or any political party or party official or candidate for political office; or (ii) violated or is in violation of any provision of the U.S. Foreign Corrupt Practices Act of 1977, as amended, the Bribery Act 2010 of the United Kingdom or any other applicable anti-bribery or anti-corruption law;

(w) The Company has conducted its business in compliance with applicable anti-corruption laws;

(x) The operations of the Company and its subsidiaries are and have been conducted at all times in compliance with the requirements of applicable anti-money laundering laws, including, but not limited to, the Bank Secrecy Act of 1970, as amended by the USA PATRIOT ACT of 2001, and the rules and regulations promulgated thereunder, and the anti-money laundering laws of the various jurisdictions in which the Company and its subsidiaries conduct business (collectively, the "Money Laundering Laws") and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any of its subsidiaries with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened;

(y) Neither the Company nor any director, officer, or to the knowledge of the Company, any employee, agent or affiliate of the Company is, or is 50% or more owned or otherwise controlled by a person that is, currently the subject or the target of any sanctions administered or enforced by the U.S. Government (including, without limitation, the Office of Foreign Assets Control of the U.S. Department of the Treasury ("OFAC"), or the U.S. Department of State and including, without limitation, the designation as a "specially designated national" or "blocked person") the European Union, Her Majesty's Treasury, the United Nations Security Council, or other relevant sanctions authority (collectively, "Sanctions"), nor is the Company or any of its subsidiaries located, organized, or resident in a country or territory that is the subject or target of Sanctions including, without limitation, Cuba, Iran, North Korea, Syria, and Crimea, and the Company will not directly or indirectly use the proceeds of the offering of the Shares

hereunder, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other person or entity (i) to fund or facilitate any activities of or business with any person, or in any country or territory, that, at the time of such funding, is the subject or the target of Sanctions or (ii) in any other manner that will result in a violation by any person (including any person participating in the transaction, whether as underwriter, advisor, investor or otherwise) of Sanctions;

(z) Each of the Company and its subsidiaries has not, is not, and will not engage in any transactions or dealings with any person, or in any country or territory, that at the time of the dealing or transaction is or was the subject or target of Sanctions;

(aa) The financial statements included in the Registration Statement, the Pricing Disclosure Package and the Prospectus, together with the related schedules and notes, present fairly in all material respects the financial position of the Company and its subsidiaries at the dates indicated and the statement of operations, stockholders' equity and cash flows of the Company and its subsidiaries for the periods specified; said financial statements have been prepared in conformity with U.S. generally accepted accounting principles ("GAAP") applied on a consistent basis throughout the periods involved. The supporting schedules, if any, present fairly in accordance with GAAP the information required to be stated therein. The selected financial data and the summary financial information included in the Registration Statement, the Pricing Disclosure Package and the Prospectus present fairly in all material respects the information shown therein and have been compiled on a basis consistent with that of the audited financial statements included therein. Except as included therein, no historical or pro forma financial statements or supporting schedules are required to be included in the Registration Statement, the Pricing Disclosure Package or the Prospectus under the Act or the rules and regulations promulgated thereunder;

(bb) From the time of initial confidential submission of a registration statement relating to the Shares with the Commission through the date hereof, the Company has been and is an "emerging growth company" as defined in Section 2(a)(19) of the Act (an "Emerging Growth Company");

(cc) There are no persons with registration rights or other similar rights to have any securities registered pursuant to the Registration Statement or otherwise registered by the Company under the Act except as have been validly waived or complied with in connection with the offering of the Shares;

(dd) No labor disturbance by or dispute with current or former employees or officers of the Company exists or, to the Company's knowledge, is contemplated or threatened, and the Company is not aware of any existing or imminent labor disturbance by, or dispute with, the employees of any of the Company's principal suppliers, manufacturers or contractors. The Company is not a party to any collective bargaining agreement.

(ee) The Company and its subsidiaries have insurance covering their respective properties, operations, personnel and business, including business interruption insurance, which insurance is in amounts and insures against such losses and risks as are reasonable and is ordinary and customary for comparable companies in the same or similar businesses; and neither the Company nor any of its subsidiaries has (i) not received notice from any insurer or agent of such insurer that capital improvements or other expenditures are required or necessary to be made in order to continue such insurance nor (ii) any reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage at reasonable cost from similar insurers as may be necessary to continue its business;

(ff) Except as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, the Company and its subsidiaries, are, and at all times, have been, in compliance with all applicable Health Care Laws (defined herein), including, but not limited to, the rules and regulations of the Food and Drug Administration (“FDA”), the U.S. Department of Health and Human Services (“HHS”) Office of Inspector General, the Centers for Medicare & Medicaid Services, the HHS Office for Civil Rights, the U.S. Department of Justice and any other governmental agency or body having jurisdiction over the Company or any of its properties, and have not engaged in any activities which are, as applicable, cause for false claims liability, civil penalties, or mandatory or permissive exclusion from Medicare, Medicaid, or any other local, state or federal healthcare program. For purposes of this Agreement, “Health Care Laws” shall mean the federal Anti-kickback Statute (42 U.S.C. § 1320a-7b(b)), the Physician Payments Sunshine Act (42 U.S.C. § 1320a-7h), the civil False Claims Act (31 U.S.C. §§ 3729 et seq.), the criminal False Claims Act (42 U.S.C. § 1320a-7b(a)), all criminal laws relating to health care fraud and abuse, including but not limited to 18 U.S.C. Sections 286, 287, 1035, 1347 and 1349, and the health care fraud criminal provisions under the Health Insurance Portability and Accountability Act of 1996 (42 U.S.C. §§ 1320d et seq.) (“HIPAA”), the exclusion law (42 U.S.C. § 1320a-7), the civil monetary penalties law (42 U.S.C. § 1320a-7a), HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act (42 U.S.C. §§ 17921 et seq.), the Federal Food, Drug, and Cosmetic Act (21 U.S.C. §§ 301 et seq.), the statutes, regulations and directives of applicable federal healthcare programs, including but not limited to Medicare (Title XVIII of the Social Security Act) and Medicaid (Title XIX of the Social Security Act), and any rules and regulations promulgated pursuant to the statutes listed herein. The Company is not a party to or has any ongoing reporting obligations pursuant to any corporate integrity agreement, deferred prosecution agreement, monitoring agreement, consent decree, settlement order, plan of correction or similar agreement imposed by any governmental authority. The Company has not received any written notification, correspondence or any other written communication, including, without limitation, any written notice of adverse finding, warning letter, untitled letter or other correspondence or notice from the FDA or any similar regulatory authority in each case alleging material noncompliance, or any written notification of any pending or threatened claim, suit, proceeding, hearing, enforcement, investigation, arbitration or other action, from any court, arbitrator, governmental or regulatory authority or third party, of potential or actual material non-compliance by, or material liability of, the Company under any Health Care Laws;

(gg) Except as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, each of the Company and its subsidiaries possesses, and is in compliance with the terms of, all applications, certificates, approvals, clearances, registrations, exemptions, franchises, licenses, permits, consents and other authorizations necessary to conduct their respective businesses (collectively, “Licenses”), issued by the appropriate Governmental Authorities, including, without limitation, all Licenses required by the FDA, or any component thereof, and/or by any other U.S., state, local or foreign government or drug regulatory agency (collectively, the “Regulatory Agencies”). All such Licenses are in full force and effect and the Company is not in violation of any term or conditions of any such License, except as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. Each of the Company and its subsidiaries has fulfilled and performed all of its respective material obligations with respect to such Licenses and, no event has occurred which allows, or after notice or lapse of time would allow, revocation or termination thereof or results in any other impairment of the rights of the holder of any such License. The Company has not received any written notice of proceedings relating to the revocation or modification of any such Licenses and to the knowledge of the Company, no Regulatory Agency has taken any action to limit, suspend or revoke any such License possessed by the Company;

(hh) The pre-clinical studies and clinical trials that are described in the Registration Statement, the Pricing Disclosure Package and the Prospectus were and, if still pending, are being, conducted in all material respects in accordance with the protocols submitted to the FDA or any foreign governmental body exercising comparable authority, and pursuant to, where applicable, all applicable laws and regulations; the Company is not aware of any other pre-clinical studies or clinical trials, the results of which reasonably and materially call into question the results described in the Registration Statement, the Pricing Disclosure Package and the Prospectus; and the Company has not received any written notices or correspondence from the FDA, any foreign, state or local governmental body exercising comparable authority or any Institutional Review Board requiring the termination, suspension or material modification of any pre-clinical studies or clinical trials conducted by or on behalf of the Company;

(ii) Neither the Company nor its subsidiaries nor any of its or their respective officers, employees, directors, agents or clinical investigators, has been excluded, suspended or debarred from participation in any U.S. federal health care program or human clinical research or, to the knowledge of the Company, is subject to a governmental inquiry, investigation, proceeding, or other similar action that could reasonably be expected to result in debarment, suspension, or exclusion, or convicted of any crime or engaged in any conduct that would reasonably be expected to result in debarment under 42 U.S.C. § 1320a-7 or 21 U.S.C. § 335a;

(jj) Except as disclosed in the Registration Statement and the Prospectus, the Company owns or has valid, binding and enforceable licenses or other rights to practice and use all patents and patent applications, copyrights, trademarks, trademark registrations, service marks, service mark registrations, trade names, service names and know-how (including trade secrets and other unpatented and/or unpatentable proprietary

or confidential information, systems or procedures) and all other technology and intellectual property rights necessary for the conduct of the business now of the Company or the proposed conduct of the business of the Company in the manner described in the Registration Statement and the Prospectus (collectively, the “Company Intellectual Property”); except as disclosed in the Registration Statement and the Prospectus, the patents included in the Intellectual Property are subsisting and have not lapsed and the patent applications in the Intellectual Property are subsisting and have not been abandoned; the Company Intellectual Property has not been adjudged by a court of competent jurisdiction invalid or unenforceable in whole or in part; there are no material defects in any of the patents or patent applications within the Intellectual Property; and to the Company’s knowledge, there are no rights of third parties to any of the Company Intellectual Property (except for customary reversion rights of third-party licensors with respect to Intellectual Property that is disclosed in the Registration Statement and Prospectus and licensed to the Company), and such intellectual property is owned by the Company free and clear of all material liens, security interests, or encumbrances; to the Company’s knowledge, there is no infringement by third parties of any of the Company Intellectual Property; other than as disclosed in the Pricing Prospectus and the Prospectus, (i) no action, suit, claim or other proceeding is pending or, to the knowledge of the Company, is threatened, alleging that the Company is infringing, misappropriating, diluting or otherwise violating any rights of others, or would, with respect to any of the Company’s product candidates, processes or intellectual property, (ii) no action, suit, claim or other proceeding is pending or, to the knowledge of the Company, is threatened, challenging the validity, enforceability, scope, registration, ownership or use of any of the Company’s Intellectual Property, (iii) no action, suit, claim or other proceeding is pending or, to the knowledge of the Company, is threatened, challenging the Company’s rights in or to any Company Intellectual Property, (iv) the Company has not received notice of any claim of infringement, misappropriation or conflict with any asserted rights of others with respect to any of the Company’s products, proposed products, processes or Company Intellectual Property, (v) the Company has taken commercially reasonable measures to protect its confidential information and trade secrets and to maintain and safeguard the Company’s Intellectual Property, including the execution of appropriate nondisclosure and confidentiality agreements and (vi) the Company has complied with the terms of each agreement pursuant to which Intellectual Property has been licensed to the Company, and all such agreements are in full force and effect, except in each case covered by clauses (i) — (vi) such as would not, if determined adversely to the Company, individually or in the aggregate, have a Material Adverse Effect.

(kk) (i) Except as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, the Company’s and its subsidiaries’ information technology assets and equipment, computers, technology systems and other systems, networks, hardware, software, websites, applications, and databases (collectively, “IT Systems”) are adequate for, and operate and perform as required in connection with the operation of the business of the Company and its subsidiaries as currently conducted, free and clear of all material bugs, errors, defects, Trojan horses, time bombs, malware and other corruptants. The Company and its subsidiaries have implemented and maintained commercially reasonable controls, policies, procedures, and safeguards to maintain and protect their material confidential information and to

ensure the privacy, confidentiality, integrity, continuous operation, redundancy and security of all physical storage facilities, IT Systems, and data used in connection with the operation of the Company or its subsidiaries (including any information that relates to an identified or identifiable individual or is otherwise considered “personal information,” “personally identifiable information” or “personal data” under applicable law, sensitive data, confidential information or regulated data in any form (collectively, the “Protected Information”). The Company and its subsidiaries have taken all commercially reasonable steps to protect the IT Systems, Protected Information and any other data used in connection with the operation of the Company and its subsidiaries, and have established and maintained commercially reasonable disaster recovery and security plans, procedures and facilities for the business, including, without limitation, for the IT Systems, Protected Information and data held or used by or for the Company and its subsidiaries. There have been no material security breaches or attacks, violations, outages, accidental or unlawful destruction, loss, alteration or unauthorized uses or disclosures of or access to any IT Systems or Protected Information, or any other material incidents or compromises of or relating to any IT Systems or Protected Information, nor any notifications by any third parties of any of the foregoing.

(ii) Except as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, the Company and its subsidiaries have at all times complied with all (x) data protection, privacy and security policies applicable to the Company or its subsidiaries, (y) contractual obligations of the Company or its subsidiaries concerning data protection, privacy, security of Protected Information, and (z) applicable laws, statutes, regulations directives, or applicable self-regulatory guidelines or standards and all judgments, orders, rules and regulations of any court or arbitrator or governmental or regulatory authority relating to the privacy and security of IT Systems and Protected Information or to the protection of such IT Systems and Protected Information from unauthorized use, access, misappropriation or modification (collectively, the “Data Protection Requirements”). The Company and its subsidiaries have at all times provided adequate notice to and obtained any necessary consents from data subjects for any past and present collection, use, disclosure, international transfer and other processing of Protected Information by or for the Company, except where the failure to do so would not, individually or in the aggregate, have a Material Adverse Effect. The Company and its subsidiaries (x) have not received written notice of any actual or potential liability under or relating to, or actual or potential violation of, any of the Data Protection Requirements, and have no knowledge of any event or condition that would reasonably be expected to result in any such notice; (y) are not currently conducting or paying for, in whole or in part, any investigation, remediation, or other corrective action relating to any Data Protection Requirement; and (z) are not a party to any order, decree, or agreement by any court or arbitrator or governmental or regulatory authority that imposes any obligation or liability relating to any Data Protection Requirement.

(ll) All patents and patent applications owned by or licensed to the Company or under which the Company has rights have, to the knowledge of the Company, been duly and properly filed and maintained; to the knowledge of the Company, the parties prosecuting such applications have complied with their duty of candor and disclosure to the U.S. Patent and Trademark Office (the “USPTO”) in connection with such

applications; the Company is not aware of any facts required to be disclosed to the USPTO that were not disclosed to the USPTO and which would preclude the grant of a patent in connection with any such application or could form the basis of a finding of invalidity with respect to any patents that have issued with respect to such applications; and to the Company's knowledge, none of the Company Intellectual Property has been adjudged by a court of competent jurisdiction invalid or unenforceable in whole or in part;

(mm) Any statistical, industry-related and market-related data included in the Pricing Disclosure Package and the Prospectus are based on or derived from sources that the Company believes to be reliable and accurate and, to the extent required, the Company has obtained the written consent to the use of such data from such sources;

(nn) The Company and its subsidiaries possess all licenses, certificates, permits and other authorizations issued by, and has made all declarations and filings with, the appropriate federal, state, local or foreign governmental or regulatory authorities having jurisdiction over the Company and its subsidiaries that are necessary for the ownership or lease of their respective properties or the conduct of their respective business as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, except where the failure to possess or make the same would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; and the Company has not received written notice of any revocation or modification of any such license, certificate, permit or authorization, except where such revocation or modification would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect;

(oo) All United States federal income tax returns and all other tax returns that are required to have been filed by them pursuant to applicable foreign, state or local laws of the Company and its subsidiaries required by law to be filed have been filed and all taxes shown as due on such returns or that otherwise have been assessed, which are due and payable, have been paid, except assessments against which appeals have been or will be promptly taken and as to which adequate reserves have been provided, except insofar as the failure to file such returns would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, and has paid all taxes due pursuant to such returns or pursuant to any assessment received by the Company and its subsidiaries, except for such taxes, if any, as are being contested in good faith. The charges, accruals and reserves on the books of the Company in respect of any income and corporation tax liability for any years not finally determined are adequate to meet any assessments or re-assessments for additional income tax for any years not finally determined, except to the extent of any inadequacy that would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. No tax deficiency has been determined adversely to the Company or its subsidiaries which has (nor does the Company or its subsidiaries have any written notice or knowledge of any tax deficiency which could reasonably be expected to be determined adversely to the Company or its subsidiaries and which would, individually or in the aggregate, reasonably be expected to have) a Material Adverse Effect;

(pp) The Company has not taken and will not take, directly or indirectly, any action that is designed to or that has constituted or might reasonably be expected to cause or result in stabilization or manipulation of the price of the Shares;

(qq) The Company is not a party to any contract, agreement or understanding with any person (other than this Agreement) that would give rise to a valid claim against the Company or any Underwriter for a brokerage commission, finder's fee or like payment in connection with the offering and sale of the Shares;

(rr) No relationship, direct or indirect, exists between or among the Company, on the one hand, and the directors, officers, stockholders, customers or suppliers of the Company, on the other, that is required by the Act to be described in the Registration Statement and the Prospectus and that is not so described in such documents and in the Registration Statement, the Pricing Disclosure Package and the Prospectus;

(ss) There is and has been no failure on the part of the Company or any of the Company's directors or officers, in their capacities as such, to comply with any provision of the Sarbanes-Oxley Act of 2002, as amended and the rules and regulations promulgated in connection therewith, including Section 402 related to loans;

(tt) On or after the Applicable Time there will be no debt securities issued or guaranteed by the Company that are rated by any "nationally recognized statistical rating organization", as that term is defined by the Commission for purposes of Rule 436(g)(2) under the Act; and

(uu) With respect to the stock options (the "Stock Options") granted pursuant to the stock-based compensation plans of the Company and its subsidiaries (the "Company Stock Plans"), (i) each Stock Option intended to qualify as an "incentive stock option" under Section 422 of the Internal Revenue Code of 1986, as amended, so qualifies, except where the failure to so qualify would not, individually or in the aggregate, reasonably be expected to have a Materially Adverse Effect, (ii) each grant of a Stock Option was duly authorized no later than the date on which the grant of such Stock Option was by its terms to be effective by all necessary corporate action, including, as applicable, approval by the board of directors of the Company (or a duly constituted and authorized committee thereof) and any required stockholder approval by the necessary number of votes or written consents, and, to the knowledge of the Company (other than with respect to due execution and delivery by the Company), the award agreement governing such grant (if any) was duly executed and delivered by each party thereto, (iii) each such grant was made in accordance with the terms of the Company Stock Plans, the Exchange Act and all other applicable laws and regulatory rules or requirements, including the rules of The Nasdaq Global Market and any other exchange on which Company securities are traded, and (iv) each such grant was properly accounted for in accordance with GAAP in the financial statements (including the related notes) of the Company.

2. Subject to the terms and conditions herein set forth, (a) the Company agrees to issue and sell to each of the Underwriters, and each of the Underwriters agrees, severally and not jointly, to purchase from the Company, at a purchase price per share of \$[●], the number of Firm Shares set forth opposite the name of such Underwriter in Schedule I hereto and (b) in the event and to the extent that the Underwriters shall exercise the election to purchase Optional Shares as provided below, the Company agrees to issue and sell to each of the Underwriters, and each of the Underwriters agrees, severally and not jointly, to purchase from the Company, at the purchase price per share set forth in clause (a) of this Section 2 (provided that the purchase price per Optional Share shall be reduced by an amount per share equal to any dividends or distributions declared by the Company and payable on the Firm Shares but not payable on the Optional Shares), that portion of the number of Optional Shares as to which such election shall have been exercised (to be adjusted by you so as to eliminate fractional shares) determined by multiplying such number of Optional Shares by a fraction, the numerator of which is the maximum number of Optional Shares which such Underwriter is entitled to purchase as set forth opposite the name of such Underwriter in Schedule I hereto and the denominator of which is the maximum number of Optional Shares that all of the Underwriters are entitled to purchase hereunder.

(i) The Company hereby grants to the Underwriters the right to purchase at their election up to [●] Optional Shares, at the purchase price per share set forth in the paragraph above, for the sole purpose of covering sales of shares in excess of the number of Firm Shares, provided that the purchase price per Optional Share shall be reduced by an amount per share equal to any dividends or distributions declared by the Company and payable on the Firm Shares but not payable on the Optional Shares. Any such election to purchase Optional Shares may be exercised only by written notice from the Representatives to the Company, given within a period of 30 calendar days after the date of this Agreement, setting forth the aggregate number of Optional Shares to be purchased and the date on which such Optional Shares are to be delivered, as determined by the Representatives but in no event earlier than the First Time of Delivery (as defined in Section 4 hereof) or, unless the Representatives and the Company otherwise agree in writing, earlier than two or later than ten business days after the date of such notice.

3. Upon the authorization by you of the release of the Firm Shares, the several Underwriters propose to offer the Firm Shares for sale upon the terms and conditions set forth in the Pricing Disclosure Package and the Prospectus.

4. (a) The Shares to be purchased by each Underwriter hereunder, in definitive or book-entry form, and in such authorized denominations and registered in such names as the Representatives may request upon at least forty-eight hours' prior notice to the Company shall be delivered by or on behalf of the Company to the Representatives, through the facilities of the Depository Trust Company ("DTC"), for the account of such Underwriter, against payment by or on behalf of such Underwriter of the purchase price therefor by wire transfer of Federal (same-day) funds to the account specified by the Company to the Representatives at least forty-eight hours in advance. The Company will cause the certificates, if any, representing the Shares to be made available for checking and packaging at least twenty-four hours prior to the Time of Delivery (as defined below) with respect thereto at the office of DTC or its designated custodian (the "Designated Office"). The time and date of such delivery and payment shall be, with respect to the

Firm Shares, 9:30 a.m., New York City time, on [●], 2020 or such other time and date as the Representatives and the Company may agree upon in writing, and, with respect to the Optional Shares, 9:30 a.m., New York City time, on the date specified by the Representatives in the written notice given by the Representatives of the Underwriters' election to purchase such Optional Shares, or such other time and date as the Representatives and the Company may agree upon in writing. Such time and date for delivery of the Firm Shares is herein called the "First Time of Delivery", such time and date for delivery of the Optional Shares, if not the First Time of Delivery, is herein called the "Second Time of Delivery", and each such time and date for delivery is herein called a "Time of Delivery".

(b) The documents to be delivered at each Time of Delivery by or on behalf of the parties hereto pursuant to Section 8 hereof, including the cross receipt for the Shares and any additional documents requested by the Underwriters pursuant to Section 8(m) hereof, will be delivered at the offices of Cooley LLP, 4401 Eastgate Mall, San Diego, California 92121-1909 (the "Closing Location"), and the Shares will be delivered at the Designated Office, all at such Time of Delivery. A meeting will be held at the Closing Location at [●] [a.m.][p.m.], New York City time, on the New York Business Day next preceding such Time of Delivery, at which meeting the final drafts of the documents to be delivered pursuant to the preceding sentence will be available for review by the parties hereto. For the purposes of this Section 4, "New York Business Day" shall mean each Monday, Tuesday, Wednesday, Thursday and Friday which is not a day on which banking institutions in New York City are generally authorized or obligated by law or executive order to close.

5. The Company agrees with each of the Underwriters:

(a) To prepare the Prospectus in a form approved by you and to file such Prospectus pursuant to Rule 424(b) under the Act not later than the Commission's close of business on the second business day following the execution and delivery of this Agreement, or, if applicable, such earlier time as may be required by Rule 430A(a)(3) under the Act; to make no further amendment or any supplement to the Registration Statement or the Prospectus prior to the last Time of Delivery which shall be disapproved by you promptly after reasonable notice thereof; to advise you, promptly after it receives notice thereof, of the time when any amendment to the Registration Statement has been filed or becomes effective or any amendment or supplement to the Prospectus has been filed and to furnish you with copies thereof; to file promptly all material required to be filed by the Company with the Commission pursuant to Rule 433(d) under the Act; to advise you, promptly after it receives notice thereof, of the issuance by the Commission of any stop order or of any order preventing or suspending the use of any Preliminary Prospectus or other prospectus in respect of the Shares, of the suspension of the qualification of the Shares for offering or sale in any jurisdiction, of the initiation or threatening of any proceeding for any such purpose or pursuant to Section 8A of the Act, or of any request by the Commission for the amending or supplementing of the Registration Statement or the Prospectus or for additional information; and, in the event of the issuance of any stop order or of any order preventing or suspending the use of any Preliminary Prospectus or other prospectus or suspending any such qualification, to promptly use its best efforts to obtain the withdrawal of such order;

(b) Promptly from time to time to take such action as you may reasonably request to qualify the Shares for offering and sale under the securities laws of such jurisdictions as you may request and to comply with such laws so as to permit the continuance of sales and dealings therein in such jurisdictions for as long as may be necessary to complete the distribution of the Shares, provided that in connection therewith the Company shall not be required to qualify as a foreign corporation (where not otherwise required) or to file a general consent to service of process in any jurisdiction (where not otherwise required);

(c) Prior to 10:00 a.m., New York City time, on the New York Business Day next succeeding the date of this Agreement (or such other time as may be agreed to by the Representatives and the Company) and from time to time, to furnish the Underwriters with written and electronic copies of the Prospectus, Preliminary Prospectus and any supplements and amendments thereto or to the Registration Statement in such quantities as the Representatives may reasonably request, and, if the delivery of a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is required at any time prior to the expiration of nine months after the time of issue of the Prospectus in connection with the offering or sale of the Shares and if at such time any event shall have occurred as a result of which the Prospectus as then amended or supplemented would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made when such Prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is delivered, not misleading, or, if for any other reason it shall be necessary during such same period to amend or supplement the Prospectus in order to comply with the Act, to notify you and, before amending or supplementing the Registration Statement, the Pricing Disclosure Package or the Prospectus, to furnish you a copy of each such proposed amendment or supplement upon your request to prepare and furnish without charge to each Underwriter and to any dealer in securities (whose name and address the Underwriters shall furnish to the Company) as many written and electronic copies as you may from time to time reasonably request of an amended Prospectus or a supplement to the Prospectus which will correct such statement or omission or effect such compliance; and in case any Underwriter is required to deliver a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) in connection with sales of any of the Shares at any time nine months or more after the time of issue of the Prospectus, upon your request but at the expense of such Underwriter, to prepare and deliver to such Underwriter as many written and electronic copies as you may request of an amended or supplemented Prospectus complying with Section 10(a)(3) of the Act;

(d) To make generally available to its securityholders as soon as practicable (which may be satisfied by filing with the Commission's Electronic Data Gathering, Analysis and Retrieval System ("EDGAR")), but in any event not later than sixteen months after the effective date of the Registration Statement (as defined in Rule 158(c) under the Act), an earnings statement of the Company and its subsidiaries (which need not be audited) complying with Section 11(a) of the Act and the rules and regulations of the Commission thereunder (including, at the option of the Company, Rule 158);

(e) (i) During the period beginning from the date hereof and continuing to and including the date 180 days after the date of the Prospectus (the "Lock-Up Period"), not to (i) offer, sell, contract to sell, pledge, grant any option to purchase, make any short sale or otherwise transfer or dispose of, directly or indirectly, or file with or confidentially submit to the Commission a registration statement under the Act relating to, any securities of the Company that are substantially similar to the Shares, including but not limited to any options or warrants to purchase shares of Stock or any securities that are convertible into or exchangeable for, or that represent the right to receive, Stock or any such substantially similar securities, (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the Stock or any such other securities, whether any such transaction described in clauses (i) or (ii) above is to be settled by delivery of Stock or such other securities, in cash or otherwise or (iii) publicly disclose the intention to do any of the foregoing, in each case, without the prior written consent of the Representatives; provided, however, that the foregoing restrictions shall not apply to (1) the Shares to be sold hereunder, (2) any shares of Stock issued upon the conversion of convertible preferred stock outstanding on the date of this Agreement in connection with the offering contemplated by this Agreement, (3) any shares of Stock or any securities or other awards (including without limitation options, restricted stock or restricted stock units) convertible into, exercisable for, or that represent the right to receive, shares of Stock pursuant to any stock option plan, incentive plan or stock purchase plan of the Company (collectively, "Company Stock Plans") or otherwise in equity compensation arrangements described in the Registration Statement and the Prospectus, provided that any directors or officers who are the recipients thereof have provided to the Representatives a signed lock-up letter substantially in the form of Annex II hereto, (4) the filing by the Company of any registration statement on Form S-8 or a successor form thereto relating to any Company Stock Plan described in the Registration Statement and the Prospectus, and (5) any shares of Stock or any securities convertible into or exchangeable for, or that represent the right to receive, shares of Stock issued in connection with any joint venture, commercial or collaborative relationship or the acquisition or license by the Company of the securities, businesses, property or other assets of another person or entity or pursuant to any employee benefit plan assumed by the Company in connection with any such acquisition, provided that in the case of clause (5), the aggregate number of shares that the Company may sell or issue or agree to sell or issue pursuant to clause (5), (x) shall not exceed 5.0% of the total number of shares of Stock issued and outstanding immediately following the completion of the transactions contemplated by this Agreement) and (y) the recipients thereof provide to the Representatives a signed lock-up letter substantially in the form of Annex II hereto; and

(ii) If the Representatives, in their sole discretion, agree to release or waive the restrictions set forth in a lock-up letter delivered pursuant to Section 8(l) hereof for an officer or director of the Company and provide the Company with notice of the impending release or waiver at least three business days before the effective date of the release or waiver, the Company agrees to announce the impending release or waiver by a press release substantially in the form of Annex I hereto through a major news service at least two business days before the effective date of the release or waiver.

(iii) To not instruct its counsel or the transfer agent to authorize or facilitate the transfer of any Shares subject to a signed lock-up letter with the underwriters substantially in the form of Annex II hereto until, in respect of any particular securityholder, the earlier to occur of (i) the expiration of the Lock-Up Period or (ii) the expiration of any similar arrangement entered into by such securityholder with the Representatives; to direct the transfer agent to place stop transfer restrictions upon any such securities of the Company that are bound by such existing “lock-up,” “market stand-off,” “holdback” or similar provisions of such agreements for the duration of the periods contemplated in the preceding clause; and not to release or otherwise grant any waiver of such provisions in such agreements during such periods without the prior written consent of the Representatives, on behalf of the Underwriters;

(f) During a period of three years from the effective date of the Registration Statement, for so long as the Company is subject to the reporting requirements of either Section 13 or Section 15(d) of the Exchange Act, to furnish to its stockholders as soon as practicable after the end of each fiscal year an annual report (including a balance sheet and statements of income, stockholders’ equity and cash flows of the Company and its consolidated subsidiaries certified by independent public accountants) and, as soon as practicable after the end of each of the first three quarters of each fiscal year (beginning with the fiscal quarter ending after the effective date of the Registration Statement), to make available to its stockholders consolidated summary financial information of the Company and its subsidiaries for such quarter in reasonable detail, provided, that no reports, documents or other information needs to be furnished pursuant to this Section 5(f) to the extent they are available on EDGAR;

(g) During a period of three years from the effective date of the Registration Statement, to furnish to you copies of all reports or other communications (financial or other) furnished to stockholders, and to deliver to you (i) as soon as they are available, copies of any reports and financial statements furnished to or filed with the Commission or any national securities exchange on which any class of securities of the Company is listed; and (ii) such additional information concerning the business and financial condition of the Company as you may from time to time reasonably request (such financial statements to be on a consolidated basis to the extent the accounts of the Company and its subsidiaries are consolidated in reports furnished to its stockholders generally or to the Commission), provided, that no reports, documents or other information needs to be furnished pursuant to this Section 5(g) to the extent they are available on EDGAR;

(h) To use the net proceeds received by it from the sale of the Shares pursuant to this Agreement in the manner specified in the Pricing Disclosure Package and the Prospectus under the caption “Use of Proceeds”;

(i) To use its best efforts to list, subject to notice of issuance, the Shares on The Nasdaq Global Market;

(j) To file with the Commission such information on Form 10-Q or Form 10-K as may be required by Rule 463 under the Act;

(k) If the Company elects to rely upon Rule 462(b), the Company shall file a Rule 462(b) Registration Statement with the Commission in compliance with Rule 462(b) by 10:00 P.M., Washington, D.C. time, on the date of this Agreement, and the Company shall at the time of filing either pay to the Commission the filing fee for the Rule 462(b) Registration Statement or give irrevocable instructions for the payment of such fee pursuant to Rule 111(b) under the Act;

(l) Upon request of any Underwriter, to furnish, or cause to be furnished, to such Underwriter an electronic version of the Company's trademarks, servicemarks and corporate logo for use on the website, if any, operated by such Underwriter for the purpose of facilitating the on-line offering of the Shares (the "License"); provided, however, that the License shall be used solely for the purpose described above, is granted without any fee and may not be assigned or transferred;

(m) To promptly notify you if the Company ceases to be an Emerging Growth Company at any time prior to the later of (i) completion of the distribution of the Shares within the meaning of the Act and (ii) completion of the Lock-Up Period referred to in Section 5(e) hereof; and

(n) To deliver to each Underwriter (or its agent), on the date of execution of this Agreement, a properly completed and executed Certification Regarding Beneficial Owners of Legal Entity Customers, together with copies of identifying documentation, and the Company undertakes to provide such additional supporting documentation as each Underwriter may reasonably request in connection with the verification of the foregoing Certification.

6. (a) The Company represents and agrees that, without the prior consent of the Representatives, it has not made and will not make any offer relating to the Shares that would constitute a "free writing prospectus" as defined in Rule 405 under the Act; each Underwriter represents and agrees that, without the prior consent of the Company and the Representatives, it has not made and will not make any offer relating to the Shares that would constitute a free writing prospectus required to be filed with the Commission; any such free writing prospectus the use of which has been consented to by the Company and the Representatives is listed on Schedule II(a) hereto;

(b) The Company has complied and will comply with the requirements of Rule 433 under the Act applicable to any Issuer Free Writing Prospectus, including timely filing with the Commission or retention where required and legending; and the Company represents that it has satisfied and agrees that it will satisfy the conditions under Rule 433 under the Act to avoid a requirement to file with the Commission any electronic road show;

(c) The Company agrees that if at any time following issuance of an Issuer Free Writing Prospectus or any Written Testing-the-Waters Communication prepared or authorized by it any event occurred or occurs as a result of which such Issuer Free Writing Prospectus or Written Testing-the-Waters Communication prepared or authorized by it would conflict with the information in the Registration Statement, the Pricing Disclosure Package or the Prospectus or would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances then prevailing, not misleading, the Company will give prompt notice thereof to the Representatives and, if requested by the Representatives, will prepare and furnish without charge to each Underwriter an Issuer Free Writing Prospectus, Written Testing-the-Waters Communication or other document which will correct such conflict, statement or omission; provided, however, that this representation and warranty shall not apply to any statements or omissions in an Issuer Free Writing Prospectus made in reliance upon and in conformity with the Underwriter Information;

(d) The Company represents and agrees that (i) it has not engaged in, or authorized any other person to engage in, any Testing-the-Waters Communications, other than Testing-the-Waters Communication with the prior consent of the Representatives with entities that the Company reasonably believes are qualified institutional buyers as defined in Rule 144A under the Act or institutions that are accredited investors as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7) or (a)(8) under the Act; and (ii) it has not distributed, or authorized any other person to distribute, any Written Testing-the-Waters Communications, other than those distributed with the prior consent of the Representatives that are listed on Schedule III(d) hereto; and the Company reconfirms that the Underwriters have been authorized to act on its behalf in engaging in Testing-the-Waters Communication;

(e) Each Underwriter represents and agrees that any Testing-the-Waters Communication undertaken by it were with entities that such Underwriter reasonably believes are qualified institutional buyers as defined in Rule 144A under the Act or institutions that are accredited investors as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7) or (a)(8) under the Act;

7. The Company covenants and agrees with the several Underwriters that the Company will pay or cause to be paid the following: (i) the fees, disbursements and expenses of the Company's counsel and accountants in connection with the registration of the Shares under the Act and all other expenses in connection with the preparation, printing, reproduction and filing of the Registration Statement, any Preliminary Prospectus, any Written Testing-the-Waters Communication, any Issuer Free Writing Prospectus and the Prospectus and amendments and supplements thereto and the mailing and delivering of copies thereof to the Underwriters and dealers; (ii) the cost of printing or producing any Agreement among Underwriters, this Agreement, the Blue Sky Memorandum, closing documents (including any compilations thereof) and any other documents in connection with the offering, purchase, sale and delivery of the Shares; (iii) all expenses in connection with the qualification of the Shares for offering and sale under state securities laws as provided in Section 5(b) hereof, including the fees and disbursements of counsel for the Underwriters in connection with such qualification and in connection with the Blue Sky survey; (iv) all fees and expenses in connection with listing the Shares on The Nasdaq Global Market; (v) the filing fees incident to, and the fees and disbursements of counsel for the Underwriters in connection with, any required

review by FINRA of the terms of the sale of the Shares; (vi) the cost of preparing stock certificates; (vii) the cost and charges of any transfer agent or registrar; and (viii) all other costs and expenses incident to the performance of its obligations hereunder which are not otherwise specifically provided for in this Section; provided, however, that the amounts payable by the Company pursuant to clauses (iii), (v) and (viii) for fees and disbursements of counsel to the Underwriters described in clauses (iii), (v) and (viii) shall not exceed \$35,000 in the aggregate. It is understood, however, that, (x) except as provided in this Section, and Sections 9 and 12 hereof, the Underwriters will pay all of their own costs and expenses, including the fees of their counsel, stock transfer taxes on resale of any of the Shares by them, and any advertising expenses connected with any offers they may make and all travel and lodging expenses of the Underwriters and their representatives and counsel; and (y) subject to the Company's and Representatives' prior written approval of each such expense, the Underwriters and the Company shall each pay 50% of the cost of chartering any aircraft to be used by the directors and officers of the Company and the employees of the Representatives in connection with the road show by the Company and the Underwriters.

8. The obligations of the Underwriters hereunder, as to the Shares to be delivered at each Time of Delivery, shall be subject, in their discretion, to the condition that all representations and warranties and other statements of the Company herein are, at and as of the Applicable Time and such Time of Delivery, true and correct, the condition that the Company shall have performed all of its obligations hereunder theretofore to be performed, and the following additional conditions:

(a) The Prospectus shall have been filed with the Commission pursuant to Rule 424(b) under the Act within the applicable time period prescribed for such filing by the rules and regulations under the Act and in accordance with Section 5(a) hereof; all material required to be filed by the Company pursuant to Rule 433(d) under the Act shall have been filed with the Commission within the applicable time period prescribed for such filing by Rule 433; if the Company has elected to rely upon Rule 462(b) under the Act, the Rule 462(b) Registration Statement shall have become effective by 10:00 P.M., Washington, D.C. time, on the date of this Agreement; no stop order suspending the effectiveness of the Registration Statement or any part thereof shall have been issued and no proceeding for that purpose or pursuant to Section 8A of the Act shall have been initiated or threatened by the Commission; no stop order suspending or preventing the use of the Pricing Disclosure Package, Prospectus or any Issuer Free Writing Prospectus shall have been initiated or threatened by the Commission; and all requests for additional information on the part of the Commission shall have been complied with to your reasonable satisfaction;

(b) Cooley LLP, counsel for the Underwriters, shall have furnished to you such written opinion and negative assurance letter, dated such Time of Delivery, in form and substance satisfactory to the Representatives, with respect to such matters as the Representatives may reasonably request, and such counsel shall have received such papers and information as they may reasonably request to enable them to pass upon such matters;

(c) Latham & Watkins LLP, counsel for the Company, shall have furnished to the Representatives their written opinion and negative assurance letter, dated such Time of Delivery, substantially in the form and substance satisfactory to the Representatives;

(d) Much Shelist, P.C., intellectual property counsel for the Company, shall have furnished to the Representatives their written opinion, dated such Time of Delivery, substantially in the form and substance satisfactory to the Representatives;

(e) On the date of the Prospectus at a time prior to the execution of this Agreement, at 9:30 a.m., New York City time, on the effective date of any post-effective amendment to the Registration Statement filed subsequent to the date of this Agreement and also at each Time of Delivery, PricewaterhouseCoopers LLP shall have furnished to the Representatives a letter or letters, dated the respective dates of delivery thereof, in form and substance satisfactory to the Representatives;

(f) (i) Neither the Company nor any of its subsidiaries shall have sustained since the date of the latest audited financial statements included in the Pricing Disclosure Package and the Prospectus any loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree, otherwise than as set forth or contemplated in the Pricing Disclosure Package and the Prospectus, and (ii) since the respective dates as of which information is given in the Pricing Disclosure Package and the Prospectus there shall not have been any change in the capital stock (other than as a result of the exercise of stock options or the award of stock options or restricted stock in the ordinary course of business pursuant to the Company's equity plans that are described in the Pricing Prospectus) or long-term debt of the Company or any of its subsidiaries or any change or effect, or any development involving a prospective change or effect, in or affecting (x) the business, properties, general affairs, management, financial position, stockholders' equity or results of operations of the Company and its subsidiaries, taken as a whole, or (y) the ability of the Company to perform its obligations under this Agreement, including the issuance and sale of the Shares, or to consummate the transactions contemplated in the Pricing Disclosure Package and the Prospectus, the effect of which, in any such case described in clause (i) or (ii), is in your judgment so material and adverse as to make it impracticable or inadvisable to proceed with the public offering or the delivery of the Shares being delivered at such Time of Delivery on the terms and in the manner contemplated in the Pricing Disclosure Package and the Prospectus;

(g) On or after the Applicable Time there shall not have occurred any of the following: (i) a suspension or material limitation in trading in securities generally on the New York Stock Exchange or on The Nasdaq Global Market; (ii) a suspension or material limitation in trading in the Company's securities on The Nasdaq Global Market; (iii) a general moratorium on commercial banking activities declared by either Federal, California State or New York State authorities or a material disruption in commercial banking or securities settlement or clearance services in the United States; (iv) the outbreak or escalation of hostilities involving the United States or the declaration by the United States of a national emergency or war or (v) the occurrence of any other calamity

or crisis or any change in financial, political or economic conditions in the United States or elsewhere, if the effect of any such event specified in clause (iv) or (v) in your judgment makes it impracticable or inadvisable to proceed with the public offering or the delivery of the Shares being delivered at such Time of Delivery on the terms and in the manner contemplated in the Pricing Disclosure Package and the Prospectus;

(h) The Shares to be sold at such Time of Delivery shall have been duly listed on The Nasdaq Global Market;

(i) The Company shall have obtained and delivered to the Underwriters executed copies of an agreement from each director, officer and substantially all other security holder of the Company representing all of the shares of capital stock of the Company, substantially to the effect set forth in Annex II hereof in form and substance satisfactory to the Representatives;

(j) The Company shall have delivered to the Representatives on the date of the Prospectus at a time prior to the execution of this Agreement and at such Time of Delivery a certificate of the Chief Financial Officer of the Company, in form and substance satisfactory to the Representatives;

(k) The Company shall have complied with the provisions of Section 5(c) hereof with respect to the furnishing of prospectuses on the New York Business Day next succeeding the date of this Agreement; and

(l) The Company shall have furnished or caused to be furnished to you at such Time of Delivery certificates of officers of the Company satisfactory to you as to the accuracy of the representations and warranties of the Company herein at and as of such Time of Delivery, as to the performance by the Company of all of its obligations hereunder to be performed at or prior to such Time of Delivery, as to the matters set forth in subsections (a) and (e) of this Section and as to such other matters as you may reasonably request.

9. (a) The Company will indemnify and hold harmless each Underwriter against any losses, claims, damages or liabilities, joint or several, to which such Underwriter may become subject, under the Act or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, any Preliminary Prospectus, the Pricing Disclosure Package or the Prospectus, or any amendment or supplement thereto, any Issuer Free Writing Prospectus, any "roadshow" as defined in Rule 433(h) under the Act (a "roadshow"), any "issuer information" filed or required to be filed pursuant to Rule 433(d) under the Act, or any Testing-the-Waters Communication prepared or authorized by the Company, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, and will reimburse each Underwriter for any legal or other expenses reasonably incurred by such Underwriter in connection with investigating or defending any such action or claim as such expenses are incurred; *provided, however*, that the Company shall not be liable in any

such case to the extent that any such loss, claim, damage or liability arises out of or is based upon an untrue statement or alleged untrue statement or omission or alleged omission made in the Registration Statement, any Preliminary Prospectus, the Pricing Disclosure Package or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, any road show, or any Testing-the-Waters Communication, in reliance upon and in conformity with the Underwriter Information.

(b) Each Underwriter, severally and not jointly, will indemnify and hold harmless the Company against any losses, claims, damages or liabilities to which the Company may become subject, under the Act or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, any Preliminary Prospectus, the Pricing Disclosure Package or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any roadshow or any Testing-the-Waters Communication, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, in each case to the extent, but only to the extent, that such untrue statement or alleged untrue statement or omission or alleged omission was made in the Registration Statement, any Preliminary Prospectus, the Pricing Disclosure Package or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any roadshow or any Testing-the-Waters Communication, in reliance upon and in conformity with the Underwriter Information; and will reimburse the Company for any legal or other expenses reasonably incurred by the Company in connection with investigating or defending any such action or claim as such expenses are incurred. As used in this Agreement with respect to an Underwriter and an applicable document, "Underwriter Information" shall mean the written information furnished to the Company by such Underwriter through the Representatives expressly for use therein; it being understood and agreed upon that the only such information furnished by any Underwriter consists of the following information in the Prospectus furnished on behalf of each Underwriter: the concession and reallowance figures appearing in the [fifth] paragraph under the caption "Underwriting", and the information contained in the [ninth, tenth and eleventh] paragraphs under the caption "Underwriting".

(c) Promptly after receipt by an indemnified party under subsection (a) or (b) of this Section 9 of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party under such subsection, notify the indemnifying party in writing of the commencement thereof; provided that the failure to notify the indemnifying party shall not relieve it from any liability that it may have under the preceding paragraphs of this Section 9 except to the extent that it has been materially prejudiced (through the forfeiture of substantive rights or defenses) by such failure; and provided further that the failure to notify the indemnifying party shall not relieve it from any liability that it may have to an indemnified party otherwise than under the preceding paragraphs of this Section 9. In case any such action shall be brought against any indemnified party and it shall notify the indemnifying party of the commencement thereof, the indemnifying party shall be entitled to participate therein and, to the extent that it shall wish, jointly with any other indemnifying party similarly notified,

to assume the defense thereof, with counsel reasonably satisfactory to such indemnified party (who shall not, except with the consent of the indemnified party, be counsel to the indemnifying party), and, after notice from the indemnifying party to such indemnified party of its election so to assume the defense thereof, the indemnifying party shall not be liable to such indemnified party under such subsection for any legal expenses of other counsel or any other expenses, in each case subsequently incurred by such indemnified party, in connection with the defense thereof other than reasonable costs of investigation. No indemnifying party shall, without the written consent of the indemnified party, effect the settlement or compromise of, or consent to the entry of any judgment with respect to, any pending or threatened action or claim in respect of which indemnification or contribution may be sought hereunder (whether or not the indemnified party is an actual or potential party to such action or claim) unless such settlement, compromise or judgment (i) includes an unconditional release of the indemnified party from all liability arising out of such action or claim and (ii) does not include a statement as to or an admission of fault, culpability or a failure to act, by or on behalf of any indemnified party.

(d) If the indemnification provided for in this Section 9 is unavailable to or insufficient to hold harmless an indemnified party under subsection (a) or (b) above in respect of any losses, claims, damages or liabilities (or actions in respect thereof) referred to therein, then each indemnifying party shall contribute to the amount paid or payable by such indemnified party as a result of such losses, claims, damages or liabilities (or actions in respect thereof) in such proportion as is appropriate to reflect the relative benefits received by the Company on the one hand and the Underwriters on the other from the offering of the Shares. If, however, the allocation provided by the immediately preceding sentence is not permitted by applicable law, then each indemnifying party shall contribute to such amount paid or payable by such indemnified party in such proportion as is appropriate to reflect not only such relative benefits but also the relative fault of the Company on the one hand and the Underwriters on the other in connection with the statements or omissions which resulted in such losses, claims, damages or liabilities (or actions in respect thereof), as well as any other relevant equitable considerations. The relative benefits received by the Company on the one hand and the Underwriters on the other shall be deemed to be in the same proportion as the total net proceeds from the offering (before deducting expenses) received by the Company bear to the total underwriting discounts and commissions received by the Underwriters, in each case as set forth in the table on the cover page of the Prospectus. The relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company on the one hand or the Underwriters on the other and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission. The Company and the Underwriters agree that it would not be just and equitable if contribution pursuant to this subsection (d) were determined by *pro rata* allocation (even if the Underwriters were treated as one entity for such purpose) or by any other method of allocation which does not take account of the equitable considerations referred to above in this subsection (d). The amount paid or payable by an indemnified party as a result of the losses, claims, damages or liabilities (or actions in respect thereof) referred to above in this subsection (d) shall be deemed to include any legal or other expenses reasonably incurred by such indemnified party in

connection with investigating or defending any such action or claim. Notwithstanding the provisions of this subsection (d), no Underwriter shall be required to contribute any amount in excess of the amount by which the total price at which the Shares underwritten by it and distributed to the public were offered to the public exceeds the amount of any damages which such Underwriter has otherwise been required to pay by reason of such untrue or alleged untrue statement or omission or alleged omission. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. The Underwriters' obligations in this subsection (d) to contribute are several in proportion to their respective underwriting obligations and not joint.

(e) The obligations of the Company under this Section 9 shall be in addition to any liability which the Company may otherwise have and shall extend, upon the same terms and conditions, to each employee, officer and director of each Underwriter and each person, if any, who controls any Underwriter within the meaning of the Act and each broker-dealer or other affiliate of any Underwriter; and the obligations of the Underwriters under this Section 9 shall be in addition to any liability which the respective Underwriters may otherwise have and shall extend, upon the same terms and conditions, to each officer and director of the Company and to each person, if any, who controls the Company within the meaning of the Act.

10. (a) If any Underwriter shall default in its obligation to purchase the Shares which it has agreed to purchase hereunder at a Time of Delivery, the Representatives may in the Representatives' discretion arrange for the Representatives or another party or other parties to purchase such Shares on the terms contained herein. If within thirty-six hours after such default by any Underwriter the Representatives do not arrange for the purchase of such Shares, then the Company shall be entitled to a further period of thirty-six hours within which to procure another party or other parties satisfactory to the Representatives to purchase such Shares on such terms. In the event that, within the respective prescribed periods, the Representatives notify the Company that the Representatives have so arranged for the purchase of such Shares, or the Company notifies the Representatives that it has so arranged for the purchase of such Shares, the Representatives or the Company shall have the right to postpone such Time of Delivery for a period of not more than seven days, in order to effect whatever changes may thereby be made necessary in the Registration Statement or the Prospectus, or in any other documents or arrangements, and the Company agrees to file promptly any amendments or supplements to the Registration Statement or the Prospectus which in your opinion may thereby be made necessary. The term "Underwriter" as used in this Agreement shall include any person substituted under this Section with like effect as if such person had originally been a party to this Agreement with respect to such Shares.

(b) If, after giving effect to any arrangements for the purchase of the Shares of a defaulting Underwriter or Underwriters by the Representatives and the Company as provided in subsection (a) above, the aggregate number of such Shares which remains unpurchased does not exceed one-eleventh of the aggregate number of all the Shares to be purchased at such Time of Delivery, then the Company shall have the right to require each non-defaulting Underwriter to purchase the number of shares which such

Underwriter agreed to purchase hereunder at such Time of Delivery and, in addition, to require each non-defaulting Underwriter to purchase its pro rata share (based on the number of Shares which such Underwriter agreed to purchase hereunder) of the Shares of such defaulting Underwriter or Underwriters for which such arrangements have not been made; but nothing herein shall relieve a defaulting Underwriter from liability for its default.

(c) If, after giving effect to any arrangements for the purchase of the Shares of a defaulting Underwriter or Underwriters by you and the Company as provided in subsection (a) above, the aggregate number of such Shares which remains unpurchased exceeds one-eleventh of the aggregate number of all the Shares to be purchased at such Time of Delivery, or if the Company shall not exercise the right described in subsection (b) above to require non-defaulting Underwriters to purchase Shares of a defaulting Underwriter or Underwriters, then this Agreement (or, with respect to the Second Time of Delivery, the obligations of the Underwriters to purchase and of the Company to sell the Optional Shares) shall thereupon terminate, without liability on the part of any non-defaulting Underwriter or the Company, except for the expenses to be borne by the Company and the Underwriters as provided in Section 7 hereof and the indemnity and contribution agreements in Section 9 hereof; but nothing herein shall relieve a defaulting Underwriter from liability for its default.

11. The respective indemnities, rights of contribution, agreements, representations, warranties and other statements of the Company and the several Underwriters, as set forth in this Agreement or made by or on behalf of them, respectively, pursuant to this Agreement, shall remain in full force and effect, regardless of any investigation (or any statement as to the results thereof) made by or on behalf of any Underwriter or any director, officer, employee, broker dealer, affiliate or controlling person of any Underwriter, or the Company, or any officer or director or controlling person of the Company, and shall survive delivery of and payment for the Shares.

12. If this Agreement shall be terminated pursuant to Section 10 hereof, the Company shall not then be under any liability to any Underwriter except as provided in Sections 7 and 9 hereof; but, if for any other reason, any Shares are not delivered by or on behalf of the Company as provided herein, or the Underwriters decline to purchase the Shares for any reason permitted under this Agreement, the Company will reimburse the Underwriters through you for all out-of-pocket expenses approved in writing by you, including fees and disbursements of counsel, reasonably incurred by the Underwriters in making preparations for the purchase, sale and delivery of the Shares not so delivered, but the Company shall then be under no further liability to any Underwriter except as provided in Sections 7 and 9 hereof.

13. In all dealings hereunder, the Representatives shall act on behalf of each of the Underwriters, and the parties hereto shall be entitled to act and rely upon any statement, request, notice or agreement on behalf of any Underwriter made or given by you jointly or by the Representatives on behalf of the Underwriters.

All statements, requests, notices and agreements hereunder shall be in writing, and (A) if to the Underwriters shall be delivered or sent by mail, telex or facsimile transmission to you as the representatives (i) in care of Goldman Sachs & Co. LLC, 200 West Street, New York, New York 10282-2198, Attention: Registration Department; (ii) in care of BofA Securities, Inc., One Bryant Park, New York, New York 10036, Attention: Syndicate Department (fax: (212) 230-8730)), with a copy to: Attention: ECM Legal (fax: (212) 230-8730)); and (iii) in care of Evercore Group L.L.C., 55 East 52nd Street, New York, New York 10055, Attention: Equity Capital Markets (fax: (212) 857-3101); and (B) if to the Company shall be delivered or sent by mail, telex or facsimile transmission to the address of the Company set forth on the cover of the Registration Statement, Attention: Secretary; provided, however, that any notice to an Underwriter pursuant to Section 9(c) hereof shall be delivered or sent by mail, telex or facsimile transmission to such Underwriter at its address set forth in its Underwriters' Questionnaire, or telex constituting such Questionnaire, which address will be supplied to the Company by you upon request. Any such statements, requests, notices or agreements shall take effect upon receipt thereof.

In accordance with the requirements of the USA Patriot Act (Title III of Pub. L. 107-56 (signed into law October 26, 2001)), the Underwriters are required to obtain, verify and record information that identifies their respective clients, including the Company, which information may include the name and address of their respective clients, as well as other information that will allow the Underwriters to properly identify their respective clients.

14. This Agreement shall be binding upon, and inure solely to the benefit of, the Underwriters, the Company and, to the extent provided in Sections 9 and 11 hereof, the officers and directors of the Company and each person who controls the Company or any Underwriter or any director, officer, employee, broker dealer, or affiliate of the Underwriters, and their respective heirs, executors, administrators, successors and assigns, and no other person shall acquire or have any right under or by virtue of this Agreement. No purchaser of any of the Shares from any Underwriter shall be deemed a successor or assign by reason merely of such purchase.

15. Time shall be of the essence of this Agreement. As used herein, the term "business day" shall mean any day when the Commission's office in Washington, D.C. is open for business.

16. The Company acknowledges and agrees that (i) the purchase and sale of the Shares pursuant to this Agreement is an arm's-length commercial transaction between the Company, on the one hand, and the several Underwriters, on the other, (ii) in connection therewith and with the process leading to such transaction each Underwriter is acting solely as a principal and not the agent or fiduciary of the Company, (iii) no Underwriter has assumed an advisory or fiduciary responsibility in favor of the Company with respect to the offering contemplated hereby or the process leading thereto (irrespective of whether such Underwriter has advised or is currently advising the Company on other matters) or any other obligation to the Company except the obligations expressly set forth in this Agreement and (iv) the Company has consulted its own legal and financial advisors to the extent it deemed appropriate. The Company agrees that it will not claim that the Underwriters, or any of them, has rendered advisory services of any nature or respect, or owes a fiduciary or similar duty to the Company, in connection with such transaction or the process leading thereto.

17. This Agreement supersedes all prior agreements and understandings (whether written or oral) between the Company and the Underwriters, or any of them, with respect to the subject matter hereof.

18. This Agreement, any claim, controversy or disputes arising under or related to this Agreement and any transaction contemplated by this Agreement and any claim, controversy or dispute arising under or related thereto shall be governed by and construed in accordance with the laws of the State of New York without regard to principles of conflict of laws that would result in the application of any other law than the laws of the State of New York. The Company agrees that any suit or proceeding arising in respect of this Agreement or any transaction contemplated by this Agreement will be tried exclusively in the U.S. District Court for the Southern District of New York or, if that court does not have subject matter jurisdiction, in any state court located in The City and County of New York and the Company agrees to submit to the jurisdiction of, and to venue in, such courts.

19. The Company and each of the Underwriters hereby irrevocably waives, to the fullest extent permitted by applicable law, any and all right to trial by jury in any legal proceeding arising out of or relating to this Agreement or the transactions contemplated hereby.

20. This Agreement may be executed by any one or more of the parties hereto in any number of counterparts, each of which shall be deemed to be an original, but all such counterparts shall together constitute one and the same instrument. This Agreement may be delivered via facsimile, electronic mail (including pdf or any electronic signature complying with the U.S. federal ESIGN Act of 2000, *e.g.*, www.docuSign.com or www.echosign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

21. Notwithstanding anything herein to the contrary, the Company is authorized to disclose to any persons the U.S. federal and state income tax treatment and tax structure of the potential transaction and all materials of any kind (including tax opinions and other tax analyses) provided to the Company relating to that treatment and structure, without the Underwriters imposing any limitation of any kind. However, any information relating to the tax treatment and tax structure shall remain confidential (and the foregoing sentence shall not apply) to the extent necessary to enable any person to comply with securities laws. For this purpose, "tax structure" is limited to any facts that may be relevant to that treatment.

22. Recognition of the U.S. Special Resolution Regimes.

(a) In the event that any Underwriter that is a Covered Entity becomes subject to a proceeding under a U.S. Special Resolution Regime, the transfer from such Underwriter of this Agreement, and any interest and obligation in or under this Agreement, will be effective to the same extent as the transfer would be effective under the U.S. Special Resolution Regime if this Agreement, and any such interest and obligation, were governed by the laws of the United States or a state of the United States.

(b) In the event that any Underwriter that is a Covered Entity or a BHC Act Affiliate of such Underwriter becomes subject to a proceeding under a U.S. Special Resolution Regime, Default Rights under this Agreement that may be exercised against such Underwriter are permitted to be exercised to no greater extent than such Default Rights could be exercised under the U.S. Special Resolution Regime if this Agreement were governed by the laws of the United States or a state of the United States.

(c) As used in this section:

“BHC Act Affiliate” has the meaning assigned to the term “affiliate” in, and shall be interpreted in accordance with, 12 U.S.C. § 1841(k).

“Covered Entity” means any of the following:

(i) a “covered entity” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 252.82(b);

(ii) a “covered bank” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 47.3(b); or

(iii) a “covered FSI” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 382.2(b).

“Default Right” has the meaning assigned to that term in, and shall be interpreted in accordance with, 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable.

“U.S. Special Resolution Regime” means each of (i) the Federal Deposit Insurance Act and the regulations promulgated thereunder and (ii) Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations promulgated thereunder.

[Signature Page Follows]

If the foregoing is in accordance with your understanding, please sign and return to us one for the Company and each of the Representatives plus one for each counsel counterparts hereof, and upon the acceptance hereof by you, on behalf of each of the Underwriters, this letter and such acceptance hereof shall constitute a binding agreement between each of the Underwriters and the Company. It is understood that your acceptance of this letter on behalf of each of the Underwriters is pursuant to the authority set forth in a form of Agreement among Underwriters, the form of which shall be submitted to the Company for examination upon request, but without warranty on your part as to the authority of the signers thereof.

Very truly yours,

4D Molecular Therapeutics, Inc.

By: _____
Name:
Title:

[Signature Page to Underwriting Agreement]

Accepted as of the date hereof:

Goldman Sachs & Co. LLC

By: _____
Name: _____
Title: _____

BofA Securities, Inc.

By: _____
Name: _____
Title: _____

Evercore Group L.L.C.

By: _____
Name: _____
Title: _____

On behalf of each of the Underwriters

[Signature Page to Underwriting Agreement]

SCHEDULE I

<u>Underwriter</u>	<u>Total Number of Firm Shares to be Purchased</u>	<u>Number of Optional Shares to be Purchased if Maximum Option Exercised</u>
Goldman Sachs & Co. LLC		
BofA Securities, Inc.		
Evercore Group L.L.C.		
[•]		
Total		

SCHEDULE II

(a) Issuer Free Writing Prospectuses not included in the Pricing Disclosure Package:

[Electronic roadshow dated [●]]

(b) Additional Documents Incorporated by Reference:

[None]

(c) Information other than the Pricing Prospectus that comprise the Pricing Disclosure Package:

The initial public offering price per share for the Shares is \$[●]

The number of Shares purchased by the Underwriters is [●].

[Add any other pricing disclosure.]

(d) Written Testing-the-Waters Communications:

[●]

Form of Press Release**4D Molecular Therapeutics, Inc.****[Date]**

4D Molecular Therapeutics, Inc. (the “Company”) announced today that Goldman Sachs & Co. LLC, BofA Securities, Inc. and Evercore Group L.L.C., the lead book-running managers in the Company’s recent public sale of shares of common stock, are [waiving] [releasing] a lock-up restriction with respect to shares of the Company’s common stock held by [certain officers or directors] [an officer or director] of the Company. The [waiver] [release] will take effect on , 20 , and the shares may be sold on or after such date.

This press release is not an offer for sale of the securities in the United States or in any other jurisdiction where such offer is prohibited, and such securities may not be offered or sold in the United States absent registration or an exemption from registration under the United States Securities Act of 1933, as amended.

Form of Lock-Up Agreement**4D MOLECULAR THERAPEUTICS, INC.****Lock-Up Agreement**

_____, 2020

Goldman Sachs & Co. LLC
BofA Securities, Inc.
Evercore Group L.L.C.

As representatives of the several Underwriters
named in Schedule I to the Underwriting Agreement

c/o Goldman Sachs & Co. LLC
200 West Street
New York, NY 10282

c/o BofA Securities, Inc.
One Bryant Park
New York, NY 10036

c/o Evercore Group L.L.C.
55 East 52nd Street
New York, NY 10055

Re: 4D Molecular Therapeutics, Inc.- Lock-Up Agreement

Ladies and Gentlemen:

The undersigned understands that you, as representatives (the "Representatives"), propose to enter into an underwriting agreement (the "Underwriting Agreement") on behalf of the several Underwriters named in Schedule I to the Underwriting Agreement (collectively, the "Underwriters"), with 4D Molecular Therapeutics, Inc., a Delaware corporation (the "Company"), providing for a public offering (the "Public Offering") of the Common Stock of the Company (the "Shares") pursuant to a Registration Statement on Form S-1 (the "Registration Statement") to be filed with the Securities and Exchange Commission (the "SEC").

In consideration of the agreement by the Underwriters to offer and sell the Shares, and of other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the undersigned agrees that, during the period beginning from the date of this Lock-Up Agreement and continuing to and including the date 180 days after the date set forth on the final prospectus (the "Final Prospectus") used to sell the Shares (the "Lock-Up Period"), the undersigned shall not, and shall not

cause or direct any of its affiliates to, (i) offer, sell, contract to sell, pledge, grant any option to purchase, lend or otherwise dispose of any shares of Common Stock of the Company, or any options or warrants to purchase any shares of Common Stock of the Company, or any securities convertible into, exchangeable for or that represent the right to receive shares of Common Stock of the Company (such options, warrants or other securities, collectively, "Derivative Instruments"), including without limitation any such shares or Derivative Instruments now owned or hereafter acquired by the undersigned or (ii) engage in any hedging or other transaction or arrangement (including, without limitation, any short sale or the purchase or sale of, or entry into, any put or call option, or combination thereof, forward, swap or any other derivative transaction or instrument, however described or defined) which is designed to, intended to, or which reasonably could be expected to lead to or result in a sale, loan, pledge or other disposition (whether by the undersigned or someone other than the undersigned), or transfer of any of the economic consequences of ownership, in whole or in part, directly or indirectly, of any shares of Common Stock of the Company or Derivative Instruments, whether any such transaction or arrangement (or instrument provided for thereunder) would be settled by delivery of Common Stock or other securities, in cash or otherwise (any such sale, loan, pledge or other disposition, or transfer of economic consequences as described in this clause (ii), "Prohibited Activity") and will not make any public announcement during the Lock-Up Period of the undersigned's intention to enter into any such Prohibited Activity during the Lock-Up Period. The undersigned represents and warrants that the undersigned is not, and has not caused or directed any of its affiliates to be or become, currently a party to any agreement or arrangement that is designed to or which reasonably could be expected to lead to or result in any Prohibited Activity during the Lock-Up Period). For the avoidance of doubt, the undersigned agrees that the foregoing provisions shall be equally applicable to any issuer-directed or other Shares the undersigned may purchase in the Public Offering. In addition, the undersigned agrees that, without the prior written consent of the Representatives on behalf of the Underwriters, it will not, during the Lock-Up Period, make any demand for or exercise any right with respect to, the registration of any Shares or any security convertible into or exercisable or exchangeable for Shares.

[The undersigned represents and warrants that no single natural person, entity or "group" (within the meaning of Section 13(d)(3) of the Securities Exchange Act of 1934, as amended (the "Exchange Act")) beneficially owns, directly or indirectly, 50% or more of the common equity interests, or 50% or more of the voting power, in the undersigned.]¹

If the undersigned is an officer or director of the Company, (i) the Representatives agree that, at least three business days before the effective date of any release or waiver of the foregoing restrictions in connection with a transfer of shares of Common Stock, the Representatives will notify the Company of the impending release or waiver, and (ii) the Company has agreed in the Underwriting Agreement to announce the impending release or waiver by press release through a major news service at least two business days before the effective date of the release or waiver. Any release or waiver granted by the Representatives hereunder to any such officer or director shall only be effective two business days after the publication date of such press release. The provisions of this paragraph will not apply if (a) the release or waiver is effected solely to permit a transfer not for consideration and (b) the transferee has agreed in writing to be bound by the same terms described in this letter to the extent and for the duration that such terms remain in effect at the time of the transfer.

¹ To be included if necessary.

Notwithstanding the foregoing, the undersigned may transfer or otherwise dispose of the undersigned's shares of Common Stock of the Company:

- (i) as a *bona fide* gift or gifts; *provided* that (1) the donee or donees thereof agree to be bound in writing by the restrictions on transfer set forth herein, (2) no filing under the [Exchange Act]²[Securities Exchange Act of 1934, as amended (the "Exchange Act")], or any other public filing or disclosure of such transfer by or on behalf of the undersigned reporting a reduction in beneficial ownership of shares of Common Stock shall be required or voluntarily made during the Lock-up Period (other than a required filing on Form 5), (3) no other public announcement shall be required or shall be made voluntarily in connection with such transfer, and (4) any such transfer shall not involve a disposition for value;
- (ii) to any trust for the direct or indirect benefit of the undersigned or the immediate family (as defined below) of the undersigned; *provided* that (1) the trustee of the trust agrees to be bound in writing by the restrictions on transfer set forth herein, (2) no filing under the Exchange Act or any other public filing or disclosure of such transfer by or on behalf of the undersigned reporting a reduction in beneficial ownership shall be required or voluntarily made during the Lock-up Period (other than a required filing on Form 5), (3) no other public announcement shall be required or shall be made voluntarily in connection with such transfer, and (4) any such transfer shall not involve a disposition for value;
- (iii) in connection with the sale of the Undersigned's Shares acquired in the Public Offering if the undersigned is not an officer or director of the Company or in open market transactions after the Public Offering; *provided* that (1) no filing under the Exchange Act or any other public filing or disclosure of such transfer by or on behalf of the undersigned reporting a reduction in beneficial ownership shall be required or voluntarily made during the Lock-up Period, and (2) no other public announcement shall be required or shall be made voluntarily in connection with such transfer;
- (iv) if the undersigned is a corporation, partnership, limited liability company, trust or other business entity (A) to another corporation, partnership, limited liability company, trust or other business entity that is an affiliate (as defined in Rule 405 promulgated under the Securities Act of 1933) or subsidiary of the undersigned, or to any investment fund or other entity controlled or managed by the undersigned or subsidiaries of the undersigned, or (B) as

² To be included if paragraph above is included.

part of a distribution, transfer or disposition without consideration by the undersigned to its stockholders, partners, members, beneficiaries or other equity holders; *provided*, however, that in the case of any distribution, transfer or disposition contemplated by clauses (A) or (B) above, (1) no filing under the Exchange Act or any other public filing or disclosure of such transfer by or on behalf of the undersigned reporting a reduction in beneficial ownership shall be required or voluntarily made during the Lock-up Period (other than a required filing on Form 5), (2) no other public announcement shall be required or shall be made voluntarily in connection with such transfer, (3) any such transfer shall not involve a disposition for value, and (4) it shall be a condition to the distribution, transfer or disposition that the transferee execute an agreement stating that the transferee is receiving and holding such securities subject to the restrictions on transfer set forth herein and there shall be no further transfer of such securities except in accordance with this Lock-Up Agreement;

- (v) to the Company in connection with the exercise or settlement of options, warrants or other rights to acquire shares of Common Stock or any security convertible into or exercisable for shares of Common Stock that will expire during the Lock-Up Period, in accordance with their terms (including the vesting or settlement of restricted stock units and including, in each case, by way of net exercise and/or to cover withholding tax obligations in connection with such exercise, vesting or settlement), pursuant to an employee benefit plan, option, warrant or other right disclosed in the Final Prospectus; *provided* that (1) any such shares issued upon exercise of such option, warrant, restricted stock unit or other right shall be subject to the restrictions on transfer set forth herein, (2) any required filing under Section 16 of the Exchange Act reporting a reduction in beneficial ownership of shares of Common Stock during the Lock-Up Period shall clearly indicate in the footnotes thereto that the filing relates to the applicable circumstances described in this clause, and (3) no other public announcement shall be required or shall be made voluntarily in connection with such transfer;
- (vi) by will or intestacy; *provided* that (1) the legatee, heir or other transferee, as the case may be, agrees to be bound in writing by the restrictions on transfer set forth herein, and (2) any such transfer shall not involve a disposition for value;
- (vii) to any immediate family member; *provided* that (1) such transferee agrees to be bound by the restrictions on transfer set forth herein, (2) no filing under the Exchange Act or any other public filing or disclosure of such transfer by or on behalf of the undersigned reporting a reduction in beneficial ownership of shares of Common Stock shall be required or voluntarily made during the Lock-up Period, (3) no other public announcement shall be required or shall be made voluntarily in connection with such transfer, and (4) any such transfer shall not involve a disposition for value;

- (viii) pursuant to a court order or a settlement agreement related to the distribution of assets in connection with the dissolution of a marriage or civil union; *provided* that (1) such transferee agrees to be bound by the restrictions on transfer set forth herein, (2) any required filing under Section 16 of the Exchange Act reporting a reduction in beneficial ownership of shares of Common Stock during the Lock-Up Period shall clearly indicate in the footnotes thereto that the filing relates to the applicable circumstances described in this clause, and (3) no other public announcement shall be required or shall be made voluntarily in connection with such transfer or disposition;
- (ix) to the Company pursuant to contractual arrangements under which the Company has, in connection with the termination of service of the undersigned, (A) the option to repurchase such shares or (B) a right of first refusal; *provided* that in the case of clauses (A) and (B) above, (1) such contractual arrangement (or a form thereof) is described in the Final Prospectus or filed as an exhibit to the Registration Statement and is in effect on the date of the Final Prospectus, (2) no filing under Section 16 of the Exchange Act or other public filing, report or announcement reporting a reduction in beneficial ownership of shares of Common Stock shall be required or shall be voluntarily made during the Lock-Up Period within 60 days after the date the undersigned ceases to provide services to the Company, and after such 60th day, if the undersigned is required to file a report under Section 16 of the Exchange Act reporting a reduction in beneficial ownership of shares of Common Stock during the Lock-Up Period, the undersigned shall clearly indicate in the footnotes thereto that the filing relates to the applicable circumstances described in this clause, and (3) no other public announcement shall be required or shall be made voluntarily in connection with such transfer;
- (x) establish a trading plan pursuant to Rule 10b5-1 under the Exchange Act for the transfer of the Undersigned's Shares; *provided* that (1) such plan does not provide for any transfers of Common Stock during the Lock-Up Period, and (2) no filing under the Exchange Act nor any other public filing or disclosure of such trading plan shall be made during the Lock-Up Period; and
- (xi) with the prior written consent of the Representatives on behalf of the Underwriters.

Further, this Lock-Up Agreement shall not restrict any sale, disposal or transfer of the Undersigned's Shares to a *bona fide* third party pursuant to a tender offer for securities of the Company or any merger, consolidation or other business combination involving a Change of Control (as defined below) of the Company occurring after the settlement of the Public Offering, that, in each case, has been approved by the board of directors of the Company; *provided* that all of the Undersigned's Shares subject to this Lock-Up Agreement that are not so transferred, sold, tendered or otherwise disposed of remain subject to this

Lock-Up Agreement; and *provided*, further, that it shall be a condition of transfer, sale, tender or other disposition that if such tender offer or other transaction is not completed, any of the Undersigned's Shares subject to this Lock-Up Agreement shall remain subject to the restrictions on transfer set forth herein. For the purposes of this paragraph, "Change of Control" means the consummation of any *bona fide* third party tender offer, merger, consolidation or other similar transaction, the result of which is that any "person" (as defined in Section 13(d)(3) of the Exchange Act), or group of persons, other than the Company or its subsidiaries, becomes the beneficial owner (as defined in Rules 13d-3 and 13d-5 of the Exchange Act) of at least 90% of the total voting power of the voting share capital of the Company.

For purposes of this Lock-Up Agreement, "immediate family" shall mean any relationship by blood, marriage or adoption, not more remote than first cousin. The undersigned now has, and, except as contemplated by clause (i), (ii), or (iii) above, for the duration of this Lock-Up Agreement will have, good and marketable title to the undersigned's shares of Common Stock of the Company, free and clear of all liens, encumbrances, and claims whatsoever. The undersigned also agrees and consents to the entry of stop transfer instructions with the Company's transfer agent and registrar against the transfer of the undersigned's shares of Common Stock of the Company except in compliance with the foregoing restrictions.

This Lock-Up Agreement may be delivered via facsimile, electronic mail (including pdf or any electronic signature complying with the U.S. federal ESIGN Act of 2000, *e.g.*, www.docuSign.com or www.echosign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

The undersigned acknowledges and agrees that the Underwriters have not provided any recommendation or investment advice nor have the Underwriters solicited any action from the undersigned with respect to the Public Offering of the Shares and the undersigned has consulted their own legal, accounting, financial, regulatory and tax advisors to the extent deemed appropriate. The undersigned further acknowledges and agrees that, although the Underwriters may provide certain Regulation Best Interest and Form CRS disclosures or other related documentation to you in connection with the Public Offering, the Underwriters are not making a recommendation to you to participate in the Public Offering or sell any Shares at the price determined in the Public Offering, and nothing set forth in such disclosures or documentation is intended to suggest that any Underwriter is making such a recommendation.

Notwithstanding anything to the contrary contained herein, this Lock-Up Agreement will automatically terminate and the undersigned will be released from all of his, her or its obligations hereunder upon the earliest to occur, if any, of (i) prior to the execution of the Underwriting Agreement, the Company advises the Representatives in writing that it has determined not to proceed with the Public Offering, (ii) the Company files an application to withdraw the registration statement related to the Public Offering, (iii) the Underwriting Agreement is executed but is terminated (other than the provisions thereof which survive termination) prior to payment for and delivery of the Shares to be sold thereunder, or (iv) March 31, 2021, in the event that the Underwriting Agreement has not been executed by such date; *provided*, however, that the Company may, by written notice to you prior to such date, extend such date for a period of up to three additional months.

The undersigned understands that the Company and the Underwriters are relying upon this Lock-Up Agreement in proceeding toward consummation of the Public Offering. The undersigned further understands that this Lock-Up Agreement is irrevocable and shall be binding upon the undersigned's heirs, legal representatives, successors, and assigns.

Very truly yours,

Name of Security Holder *(Print exact name)*

By: _____
Signature

If not signing in an individual capacity:

Name of Authorized Signatory *(Print)*

Title of Authorized Signatory *(Print)*

(indicate capacity of person signing if signing as custodian, trustee, or on behalf of an entity)

[Signature Page to Lockup Agreement]

AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION OF
4D MOLECULAR THERAPEUTICS, INC.

4D Molecular Therapeutics, Inc., a corporation organized and existing under the laws of the State of Delaware (the "**Corporation**"), certifies that:

1. The name of the Corporation is 4D Molecular Therapeutics, Inc. The Corporation's original Certificate of Incorporation was filed with the Secretary of State of the State of Delaware on March 11, 2015.
2. The Amended and Restated Certificate of Incorporation in the form of Exhibit A attached hereto has been duly adopted in accordance with the provisions of Sections 242, 245 and 228 of the Delaware General Corporation Law.
3. The text of the Amended and Restated Certificate of Incorporation as heretofore amended or supplemented is hereby restated and further amended to read in its entirety as set forth in Exhibit A attached hereto. The Amended and Restated Certificate of Incorporation shall be effective as of 9:00 a.m. Eastern Time on _____, 2020.

IN WITNESS WHEREOF, this Amended and Restated Certificate of Incorporation has been signed this ___th day of _____, 2020.

4D MOLECULAR THERAPEUTICS, INC.

By: _____
David Kim
Chief Executive Officer

EXHIBIT A

**AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION OF
4D MOLECULAR THERAPEUTICS, INC.**

**ARTICLE I
NAME**

The name of the corporation is 4D Molecular Therapeutics, Inc. (the “*Corporation*”).

**ARTICLE II
REGISTERED OFFICE AND AGENT**

The address of the Corporation’s registered office in the State of Delaware is 1209 Orange Street, in the City of Wilmington, County of New Castle, 19801. The name of its registered agent at such address is The Corporation Trust Company.

**ARTICLE III
PURPOSE AND DURATION**

The purpose of the Corporation is to engage in any lawful act or activity for which a corporation may be organized under the Delaware General Corporation Law. The Corporation is to have a perpetual existence.

**ARTICLE IV
CAPITAL STOCK**

Section 1. This Corporation is authorized to issue two classes of capital stock which shall be designated, respectively, “Common Stock” and “Preferred Stock.” The total number of shares that the Corporation is authorized to issue is 310,000,000, of which 300,000,000 shares shall be Common Stock and 10,000,000 shares shall be Preferred Stock. The Common Stock shall have a par value of \$0.0001 per share and the Preferred Stock shall have a par value of \$0.0001 per share. Subject to the rights of the holders of any series of Preferred Stock, the number of authorized shares of any of the Common Stock or Preferred Stock may be increased or decreased (but not below the number of shares thereof then outstanding) by the affirmative vote of the holders of a majority in voting power of the stock of the Corporation with the power to vote thereon irrespective of the provisions of Section 242(b)(2) of the Delaware General Corporation Law or any successor provision thereof, and no vote of the holders of any of the Common Stock or Preferred Stock voting separately as a class shall be required therefor.

Section 2. Shares of Preferred Stock may be issued from time to time in one or more series. The Board of Directors of the Corporation (the “*Board of Directors*”) is hereby authorized to provide from time to time by resolution or resolutions for the creation and issuance, out of the authorized and unissued shares of Preferred Stock, of one or more series of Preferred Stock by filing a certificate (a “*Certificate of Designation*”) pursuant to the Delaware General Corporation Law, setting forth such resolution and, with respect to each such series, establishing the designation of such series and the number of shares to be included in such series and fixing

the voting powers (full or limited, or no voting power), preferences and relative, participating, optional or other special rights, and the qualifications, limitations and restrictions thereof, of the shares of each such series. Without limiting the generality of the foregoing, the resolution or resolutions providing for the establishment of any series of Preferred Stock may, to the extent permitted by law, provide that such series shall be superior to, rank equally with or be junior to the Preferred Stock of any other series. The powers, preferences and relative, participating, optional and other special rights of each series of Preferred Stock, and the qualifications, limitations or restrictions thereof, if any, may be different from those of any and all other series at any time outstanding. Except as otherwise expressly provided in the resolution or resolutions providing for the establishment of any series of Preferred Stock, no vote of the holders of shares of Preferred Stock or Common Stock shall be a prerequisite to the issuance of any shares of any series of the Preferred Stock so authorized in accordance with this Amended and Restated Certificate of Incorporation. Unless otherwise provided in the Certificate of Designation establishing a series of Preferred Stock, the Board of Directors may, by resolution or resolutions, increase or decrease (but not below the number of shares of such series then outstanding) the number of shares of such series and, if the number of shares of such series shall be so decreased, the shares constituting such decrease shall resume the status that they had prior to the adoption of the resolution originally fixing the number of shares of such series.

ARTICLE V **BOARD OF DIRECTORS**

For the management of the business and for the conduct of the affairs of the Corporation it is further provided that:

Section 1.

(a) The management of the business and the conduct of the affairs of the Corporation shall be vested in the Board of Directors. The number of directors which shall constitute the whole Board of Directors shall be fixed exclusively by one or more resolutions adopted from time to time by the Board of Directors. Except as otherwise expressly delegated by resolution of the Board of Directors, the Board of Directors shall have the exclusive power and authority to appoint and remove officers of the Corporation.

(b) Other than any directors elected by the separate vote of the holders of one or more series of Preferred Stock, the Board of Directors shall be and is divided into three classes, designated as Class I, Class II and Class III, as nearly equal in number as possible. Directors shall be assigned to each class in accordance with a resolution or resolutions adopted by the Board of Directors. At the first annual meeting of stockholders following the effectiveness of this Amended and Restated Certificate of Incorporation (the “*Qualifying Record Date*”), the term of office of the Class I directors shall expire and Class I directors shall be elected for a full term of three years. At the second annual meeting of stockholders following the Qualifying Record Date, the term of office of the Class II directors shall expire and Class II directors shall be elected for a full term of three years. At the third annual meeting of stockholders following the Qualifying Record Date, the term of office of the Class III directors shall expire and Class III directors shall be elected for a full term of three years. Subject to the special rights of the holders of one or more series of Preferred Stock to elect directors, at each succeeding annual meeting of stockholders, directors shall be elected for a full term of three years to succeed the directors of the class whose terms expire at such annual meeting.

Notwithstanding the foregoing provisions of this Article V, Section 1(b), each director shall serve until his or her successor is duly elected and qualified or until his or her earlier death, resignation, disqualification, retirement or removal. No decrease in the number of directors constituting the Board of Directors shall shorten the term of any incumbent director.

(c) Subject to the special rights of the holders of one or more series of Preferred Stock to elect directors, the Board of Directors or any individual director may be removed from office at any time, but only for cause and only by the affirmative vote of the holders of sixty-six and two-thirds percent (66-2/3%) of the voting power of all the then outstanding shares of voting stock of the Corporation with the power to vote at an election of directors (the "**Voting Stock**").

(d) Subject to the special rights of the holders of one or more series of Preferred Stock to elect directors, any vacancies on the Board of Directors resulting from death, resignation, disqualification, retirement, removal or other causes and any newly created directorships resulting from any increase in the number of directors shall, unless the Board of Directors determines by resolution that any such vacancies or newly created directorships shall be filled by the stockholders, and except as otherwise provided by law, be filled only by the affirmative vote of a majority of the directors then in office, even though less than a quorum, or by a sole remaining director, and shall not be filled by the stockholders. Any director appointed in accordance with the preceding sentence shall hold office for a term that shall coincide with the remaining term of the class to which the director shall have been appointed and until such director's successor shall have been elected and qualified or until his or her earlier death, resignation, disqualification, retirement or removal.

Section 2.

(a) In furtherance and not in limitation of the powers conferred by statute, the Board of Directors is expressly authorized to make, alter or repeal Bylaws of the Corporation. In addition to any vote of the holders of any class or series of stock of the Corporation required by applicable law or by this Amended and Restated Certificate of Incorporation (including any Certificate of Designation in respect of one or more series of Preferred Stock), the adoption, amendment or repeal of the Bylaws of the Corporation by the stockholders of the Corporation shall require the affirmative vote of the holders of at least sixty-six and two-thirds percent (66-2/3%) of the voting power of all the then-outstanding shares of the Voting Stock, voting together as a single class.

(b) The directors of the Corporation need not be elected by written ballot unless the Bylaws so provide.

ARTICLE VI **STOCKHOLDERS**

Section 1. Subject to the special rights of the holders of one or more series of Preferred Stock, any action required or permitted to be taken by the stockholders of the Corporation must be effected at a duly called annual or special meeting of the stockholders of the Corporation, and the taking of any action by written consent of the stockholders in lieu of a meeting of the stockholders is specifically denied.

Section 2. Subject to the special rights of the holders of one or more series of Preferred Stock, special meetings of the stockholders of the Corporation may be called, for any purpose or purposes, at any time by the Board of Directors, chief executive officer or president (in the absence of a chief executive officer), but such special meetings may not be called by stockholders or any other person or persons.

Section 3. Advance notice of stockholder nominations for the election of directors and of other business proposed to be brought by stockholders before any meeting of the stockholders of the Corporation shall be given in the manner provided in the Bylaws of the Corporation.

ARTICLE VII **LIABILITY AND INDEMNIFICATION**

Section 1. To the fullest extent permitted by the Delaware General Corporation Law, as the same exists or as may hereafter be amended, a director of the Corporation shall not be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director. If the Delaware General Corporation Law is amended after approval by the stockholders of this Article VII to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the Delaware General Corporation Law as so amended, automatically and without further action, upon the date of such amendment.

Section 2. The Corporation, to the fullest extent permitted by law, shall indemnify and advance expenses to any person made or threatened to be made a party to an action, suit or proceeding, whether criminal, civil, administrative or investigative, by reason of the fact that he or she, or his or her testator or intestate, is or was a director or officer of the Corporation or any predecessor of the Corporation, or serves or served at any other enterprise as a director or officer at the request of the Corporation or any predecessor to the Corporation.

Section 3. The Corporation, to the fullest extent permitted by law, may indemnify and advance expenses to any person made or threatened to be made a party to an action, suit or proceeding, whether criminal, civil, administrative or investigative, by reason of the fact that he or she, or his or her testator or intestate, is or was an employee or agent of the Corporation or any predecessor of the Corporation, or serves or served at any other enterprise as an employee or agent at the request of the Corporation or any predecessor to the Corporation.

Section 4. Neither any amendment nor repeal of this Article VII, nor the adoption by amendment of this certificate of incorporation of any provision inconsistent with this Article VII, shall eliminate or reduce the effect of this Article VII in respect of any matter occurring, or any action or proceeding accruing or arising (or that, but for this Article VII, would accrue or arise) prior to such amendment or repeal or adoption of an inconsistent provision.

ARTICLE VIII
EXCLUSIVE FORUM

Unless the Corporation consents in writing to the selection of an alternative forum, (a) the Court of Chancery (the “*Chancery Court*”) of the State of Delaware (or, in the event that the Chancery Court does not have jurisdiction, the federal district court for the District of Delaware or other state courts of the State of Delaware) shall, to the fullest extent permitted by law, be the sole and exclusive forum for (i) any derivative action, suit or proceeding brought on behalf of the Corporation, (ii) any action, suit or proceeding asserting a claim of breach of a fiduciary duty owed by any director, officer or stockholder of the Corporation to the Corporation or to the Corporation’s stockholders, (iii) any action, suit or proceeding arising pursuant to any provision of the Delaware General Corporation Law or the bylaws of the Corporation or this Amended and Restated Certificate (as either may be amended from time to time) or (iv) any action, suit or proceeding asserting a claim against the Corporation governed by the internal affairs doctrine; and (b) subject to the preceding provisions of this Article VIII, the federal district courts of the United States of America shall be the exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act of 1933, as amended. If any action the subject matter of which is within the scope of clause (a) of the immediately preceding sentence is filed in a court other than the courts in the State of Delaware (a “**Foreign Action**”) in the name of any stockholder, such stockholder shall be deemed to have consented to (x) the personal jurisdiction of the state and federal courts in the State of Delaware in connection with any action brought in any such court to enforce the provisions of clause (a) of the immediately preceding sentence and (y) having service of process made upon such stockholder in any such action by service upon such stockholder’s counsel in the Foreign Action as agent for such stockholder.

Any person or entity purchasing or otherwise acquiring any interest in any security of the Corporation shall be deemed to have notice of and consented to this Article VIII. Notwithstanding the foregoing, the provisions of this Article VIII shall not apply to suits brought to enforce any liability or duty created by the Securities Exchange Act of 1934, as amended, or any other claim for which the federal courts of the United States have exclusive jurisdiction.

If any provision or provisions of this Article VIII shall be held to be invalid, illegal or unenforceable as applied to any circumstance for any reason whatsoever, (a) the validity, legality and enforceability of such provisions in any other circumstance and of the remaining provisions of this Article VIII (including, without limitation, each portion of any paragraph of this Article VIII containing any such provision held to be invalid, illegal or unenforceable that is not itself held to be invalid, illegal or unenforceable) shall not in any way be affected or impaired thereby and (b) the application of such provision to other persons or entities and circumstances shall not in any way be affected or impaired thereby.

ARTICLE IX
AMENDMENTS

Notwithstanding any other provisions of this Amended and Restated Certificate of Incorporation or any provision of law which might otherwise permit a lesser vote or no vote, but in addition to any affirmative vote of the holders of any particular class or series of the Voting Stock required by law or by this Amended and Restated Certificate of Incorporation (including

any Certificate of Designation in respect of one or more series of Preferred Stock), the affirmative vote of the holders of at least sixty-six and two-thirds percent (66-2/3%) of the voting power of all of the then-outstanding shares of the Voting Stock, voting together as a single class, shall be required to alter, amend or repeal Articles V, VI, VII and VIII and this Article IX.

* * * *

**AMENDED AND RESTATED BYLAWS OF
4D MOLECULAR THERAPEUTICS, INC.
(a Delaware corporation)**

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**AMENDED AND RESTATED
BYLAWS OF
4D MOLECULAR THERAPEUTICS, INC.**

(Adopted _____, 2020)
(Effective as of _____, 2020)

ARTICLE I - CORPORATE OFFICES

1.1 REGISTERED OFFICE.

The registered office of 4D Molecular Therapeutics, Inc. (the "Corporation") shall be fixed in the Corporation's certificate of incorporation, as the same may be amended from time to time (the "Certificate of Incorporation").

1.2 OTHER OFFICES.

The Corporation's board of directors (the "Board") may at any time establish other offices at any place or places where the Corporation is qualified to do business.

ARTICLE II - MEETINGS OF STOCKHOLDERS

2.1 PLACE OF MEETINGS.

Meetings of stockholders shall be held at any place, within or outside the State of Delaware, designated by the Board. The Board may, in its sole discretion, determine that a meeting of stockholders shall not be held at any place, but may instead be held solely by means of remote communication as authorized by Section 211(a)(2) of the General Corporation Law of the State of Delaware (the "DGCL"). In the absence of any such designation or determination, stockholders' meetings shall be held at the Corporation's principal executive office.

2.2 ANNUAL MEETING.

The Board shall designate the date and time of the annual meeting. At the annual meeting, directors shall be elected and other proper business properly brought before the meeting in accordance with Section 2.4 may be transacted. The Corporation may postpone, reschedule or cancel any annual meeting of stockholders previously scheduled by the Board

2.3 SPECIAL MEETING.

Except as otherwise provided by the Certificate of Incorporation, a special meeting of the stockholders may be called at any time by the Board, chief executive officer or president (in the absence of a chief executive officer), but such special meetings may not be called by the stockholders or any other person or persons.

No business may be transacted at such special meeting other than the business specified in the notice to stockholders. Nothing contained in this paragraph of this Section 2.3 shall be construed as limiting, fixing, or affecting the time when a meeting of stockholders called by action of the Board may be held. The Corporation may postpone, reschedule or cancel any special meeting of stockholders previously scheduled by the Chair of the Board or by the Secretary of the Corporation upon direction of the Board.

2.4 ADVANCE NOTICE PROCEDURES FOR BUSINESS BROUGHT BEFORE A MEETING.

(i) At an annual meeting of the stockholders, only such business shall be conducted as shall have been properly brought before the meeting. To be properly brought before an annual meeting, business must be (a) specified in a notice of meeting given by or at the direction of the Board, (b) if not specified in a notice of meeting, otherwise brought before the meeting by or at the direction of the Board or the chairperson of the Board, or (c) otherwise properly brought before the meeting by a stockholder present in person who (A)(1) was a beneficial owner of shares of the Corporation both at the time of giving the notice provided for in this Section 2.4 and at the time of the meeting, (2) is entitled to vote at the meeting and (3) has complied with this Section 2.4 in all applicable respects, or (B) properly made such proposal in accordance with Rule 14a-8 under the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder (as so amended and inclusive of such rules and regulations, the "Exchange Act"), which proposal has been included in the proxy statement for the annual meeting. The foregoing clause (c) shall be the exclusive means for a stockholder to propose business to be brought before an annual meeting of the stockholders. The only matters that may be brought before a special meeting are the matters specified in the notice of meeting given by or at the direction of the person calling the meeting pursuant to Section 2.3 of these bylaws, and stockholders shall not be permitted to propose business to be brought before a special meeting of the stockholders. For purposes of this Section 2.4, "present in person" shall mean that the stockholder proposing that the business be brought before the annual meeting of the Corporation, or, if the proposing stockholder is not an individual, a qualified representative of such proposing stockholder, appear at such annual meeting. A "qualified representative" of such proposing stockholder shall be, if such proposing stockholder is (x) a general or limited partnership, any general partner or person who functions as a general partner of the general or limited partnership or who controls the general or limited partnership, (y) a corporation or a limited liability company, any officer or person who functions as an officer of the corporation or limited liability company or any officer, director, general partner or person who functions as an officer, director or general partner of any entity ultimately in control of the corporation or limited liability company or (z) a trust, any trustee of such trust. Stockholders seeking to nominate persons for election to the Board must comply with Section 2.5 of these bylaws, and this Section 2.4 shall not be applicable to nominations except as expressly provided in Section 2.5 of these bylaws.

(ii) For business to be properly brought before an annual meeting by a stockholder, the stockholder must (a) provide Timely Notice (as defined below) thereof in writing and in proper form to the Secretary of the Corporation and (b) provide any updates or supplements to such notice at the times and in the forms required by this Section 2.4. To be timely, a stockholder's notice must be delivered to, or mailed and received at, the principal executive offices of the Corporation not less than ninety (90) days nor more than one hundred twenty (120) days prior to the one-year anniversary of the preceding year's annual meeting; *provided, however*, that if the date of the annual meeting is more than thirty (30) days before or more than sixty (60) days after such anniversary date, notice by the stockholder to be timely must be so delivered, or mailed and received, not later than the ninetieth (90th) day prior to such annual meeting or, if later, the tenth (10th) day following the day on which public disclosure of the date of such annual meeting was first made (such notice within such time periods, "Timely Notice"). In no event shall any adjournment or postponement of an annual meeting or the announcement thereof commence a new time period for the giving of Timely Notice as described above.

(iii) To be in proper form for purposes of this Section 2.4, a stockholder's notice to the Secretary shall set forth:

(a) As to each Proposing Person (as defined below), (A) the name and address of such Proposing Person (including, if applicable, the name and address that appear on the Corporation's books and records); and (B) the class or series and number of shares of the Corporation that are, directly or indirectly, owned of record or beneficially owned (within the meaning of Rule 13d-3 under the Exchange Act) by such Proposing Person, except that such Proposing Person shall in all events be deemed to beneficially own any shares of any class or series of stock of the Corporation as to which such Proposing Person has a right to acquire beneficial ownership at any time in the future (the disclosures to be made pursuant to the foregoing clauses (A) and (B) are referred to as "Stockholder Information");

(b) As to each Proposing Person, (A) the full notional amount of any securities that, directly or indirectly, underlie any "derivative security" (as such term is defined in Rule 16a-1(c) under the Exchange Act) that constitutes a "call equivalent position" (as such term is defined in Rule 16a-1(b) under the Exchange Act) ("Synthetic Equity Position") and that is, directly or indirectly, held or maintained by such Proposing Person with respect to any shares of any class or series of stock of the Corporation; *provided* that, for the purposes of the definition of "Synthetic Equity Position," the term "derivative security" shall also include any security or instrument that would not otherwise constitute a "derivative security" as a result of any feature that would make any conversion, exercise or similar right or privilege of such security or instrument becoming determinable only at some future date or upon the happening of a future occurrence, in which case the determination of the amount of securities into which such security or instrument would be convertible or exercisable shall be made assuming that such security or instrument is immediately convertible or exercisable at the time of such determination; and, *provided, further*, that any

Proposing Person satisfying the requirements of Rule 13d-1(b)(1) under the Exchange Act (other than a Proposing Person that so satisfies Rule 13d-1(b)(1) under the Exchange Act solely by reason of Rule 13d-1(b)(1)(ii)(E)) shall not be deemed to hold or maintain the notional amount of any securities that underlie a Synthetic Equity Position held by such Proposing Person as a hedge with respect to a bona fide derivatives trade or position of such Proposing Person arising in the ordinary course of such Proposing Person's business as a derivatives dealer, (B) any rights to dividends on the shares of any class or series of shares of the Corporation owned beneficially by such Proposing Person that are separated or separable from the underlying shares of the Corporation, (C)(x) if such Proposing Person is (i) a general or limited partnership, syndicate or other group, the identity of each general partner and each person who functions as a general partner of the general or limited partnership, each member of the syndicate or group and each person controlling the general partner or member, (ii) a corporation or a limited liability company, the identity of each officer and each person who functions as an officer of the corporation or limited liability company, each person controlling the corporation or limited liability company and each officer, director, general partner and person who functions as an officer, director or general partner of any entity ultimately in control of the corporation or limited liability company or (iii) a trust, any trustee of such trust (each such person or persons set forth in the preceding clauses (i), (ii) and (iii), a "Responsible Person"), any fiduciary duties owed by such Responsible Person to the equity holders or other beneficiaries of such Proposing Person and any material interests or relationships of such Responsible Person that are not shared generally by other record or beneficial holders of the shares of any class or series of the Corporation and that reasonably could have influenced the decision of such Proposing Person to propose such business to be brought before the meeting, and (y) if such Proposing Person is a natural person, any material interests or relationships of such natural person that are not shared generally by other record or beneficial holders of the shares of any class or series of the Corporation and that reasonably could have influenced the decision of such Proposing Person to propose such business to be brought before the meeting, (D) any material shares or any Synthetic Equity Position in any principal competitor of the Corporation in any principal industry of the Corporation held by such Proposing Persons, (E) a summary of any material discussions regarding the business proposed to be brought before the meeting (x) between or among any of the Proposing Persons or (y) between or among any Proposing Person and any other record or beneficial holder of the shares of any class or series of the Corporation (including their names), (F) any material pending or threatened legal proceeding in which such Proposing Person is a party or material participant involving the Corporation or any of its officers or directors, or any affiliate of the Corporation, (G) any other material relationship between such Proposing Person, on the one hand, and the Corporation, any affiliate of the Corporation or any principal competitor of the Corporation, on the other hand, (H) any direct or indirect material interest in any material contract or agreement of such Proposing Person with the Corporation, any affiliate of the Corporation or any principal competitor of the

Corporation (including, in any such case, any employment agreement, collective bargaining agreement or consulting agreement) and (I) any other information relating to such Proposing Person that would be required to be disclosed in a proxy statement or other filing required to be made in connection with solicitations of proxies or consents by such Proposing Person in support of the business proposed to be brought before the meeting pursuant to Section 14(a) of the Exchange Act (the disclosures to be made pursuant to the foregoing clauses (A) through (I) are referred to as “Disclosable Interests”); *provided, however*, that Disclosable Interests shall not include any such disclosures with respect to the ordinary course business activities of any broker, dealer, commercial bank, trust company or other nominee who is a Proposing Person solely as a result of being the stockholder directed to prepare and submit the notice required by these bylaws on behalf of a beneficial owner; and

(c) As to each item of business that the stockholder proposes to bring before the annual meeting, (A) a brief description of the business desired to be brought before the annual meeting, the reasons for conducting such business at the annual meeting and any material interest in such business of each Proposing Person, (B) the text of the proposal or business (including the text of any resolutions proposed for consideration and in the event that such business includes a proposal to amend the bylaws of the Corporation, the language of the proposed amendment), (C) a reasonably detailed description of all agreements, arrangements and understandings between or among any of the Proposing Persons or between or among any Proposing Person and any other person or entity (including their names) in connection with the proposal of such business by such stockholder and (D) any other information relating to such item of business that would be required to be disclosed in a proxy statement or other filing required to be made in connection with solicitations of proxies in support of the business proposed to be brought before the meeting pursuant to Section 14(a) of the Exchange Act; *provided, however*, that the disclosures required by this Section 2.4(iii) shall not include any disclosures with respect to any broker, dealer, commercial bank, trust company or other nominee who is a Proposing Person solely as a result of being the stockholder directed to prepare and submit the notice required by these bylaws on behalf of a beneficial owner.

(iv) For purposes of this Section 2.4, the term “Proposing Person” shall mean (a) the stockholder providing the notice of business proposed to be brought before an annual meeting, (b) the beneficial owner or beneficial owners, if different, on whose behalf the notice of the business proposed to be brought before the annual meeting is made and (c) any participant (as defined in paragraphs (a)(ii)-(vi) of Instruction 3 to Item 4 of Schedule 14A) with such stockholder in such solicitation or associate (within the meaning of Rule 12b-2 under the Exchange Act for the purposes of these bylaws) of such stockholder or beneficial owner.

(v) A Proposing Person shall update and supplement its notice to the Corporation of its intent to propose business at an annual meeting, if necessary, so that the information provided or required to be provided in such notice pursuant to this Section 2.4 shall be true and correct as of the record date for notice of the meeting and as of the date that is ten (10) business days prior to the meeting or any adjournment or postponement thereof, and such update and supplement shall be delivered to, or mailed and received by, the Secretary at the principal executive offices of the Corporation not later than five (5) business days after the record date for notice of the meeting (in the case of the update and supplement required to be made as of such record date), and not later than eight (8) business days prior to the date for the meeting or, if practicable, any adjournment or postponement thereof (and, if not practicable, on the first practicable date prior to the date to which the meeting has been adjourned or postponed) (in the case of the update and supplement required to be made as of ten (10) business days prior to the meeting or any adjournment or postponement thereof).

(vi) Notwithstanding anything in these bylaws to the contrary, no business shall be conducted at an annual meeting that is not properly brought before the meeting in accordance with this Section 2.4. The presiding officer of the meeting shall, if the facts warrant, determine that the business was not properly brought before the meeting in accordance with this Section 2.4, and if he or she should so determine, he or she shall so declare to the meeting and any such business not properly brought before the meeting shall not be transacted.

(vii) This Section 2.4 is expressly intended to apply to any business proposed to be brought before an annual meeting of stockholders, other than any proposal made in accordance with Rule 14a-8 under the Exchange Act and included in the Corporation's proxy statement. In addition to the requirements of this Section 2.4 with respect to any business proposed to be brought before an annual meeting, each Proposing Person shall comply with all applicable requirements of the Exchange Act with respect to any such business. Nothing in this Section 2.4 shall be deemed to affect the rights of stockholders to request inclusion of proposals in the Corporation's proxy statement pursuant to Rule 14a-8 under the Exchange Act.

(viii) For purposes of these bylaws, "public disclosure" shall mean disclosure in a press release reported by a national news service or in a document publicly filed by the Corporation with the Securities and Exchange Commission pursuant to Sections 13, 14 or 15(d) of the Exchange Act.

2.5 ADVANCE NOTICE PROCEDURES FOR NOMINATIONS OF DIRECTORS.

(i) Nominations of any person for election to the Board at an annual meeting or at a special meeting (but only if the election of directors is a matter specified in the notice of meeting given by or at the direction of the person calling such special meeting) may be made at such meeting only (a) by or at the direction of the Board, including by any committee or persons authorized to do so by the Board or these bylaws, or (b) by a stockholder present in person (A) who was a beneficial owner of shares of the Corporation both at the time of giving the notice provided for in this Section 2.5 and at the time of the meeting, (B) is entitled to vote at the meeting and (C) has complied with this Section 2.5 as to such notice and nomination. The foregoing clause (b) shall be the exclusive means for a stockholder to make any nomination of a person or persons for election to the Board at an annual meeting or special meeting. For purposes of this Section 2.5, "present in person" shall

mean that the stockholder proposing that the business be brought before the meeting of the Corporation, or, if the proposing stockholder is not an individual, a qualified representative of such stockholder, appear at such meeting. A “qualified representative” of such proposing stockholder shall be, if such proposing stockholder is (x) a general or limited partnership, any general partner or person who functions as a general partner of the general or limited partnership or who controls the general or limited partnership, (y) a corporation or a limited liability company, any officer or person who functions as an officer of the corporation or limited liability company or any officer, director, general partner or person who functions as an officer, director or general partner of any entity ultimately in control of the corporation or limited liability company or (z) a trust, any trustee of such trust.

(ii) Without qualification, for a stockholder to make any nomination of a person or persons for election to the Board at an annual meeting, the stockholder must (a) provide Timely Notice (as defined in Section 2.4(ii) of these bylaws) thereof in writing and in proper form to the Secretary of the Corporation, (b) provide the information with respect to such stockholder and its proposed nominee as required by this Section 2.5, and (c) provide any updates or supplements to such notice at the times and in the forms required by this Section 2.5. Without qualification, if the election of directors is a matter specified in the notice of meeting given by or at the direction of the person calling such special meeting, then for a stockholder to make any nomination of a person or persons for election to the Board at a special meeting, the stockholder must (a) provide timely notice thereof in writing and in proper form to the Secretary of the Corporation at the principal executive offices of the Corporation, (b) provide the information with respect to such stockholder and its proposed nominee as required by this Section 2.5, and (c) provide any updates or supplements to such notice at the times and in the forms required by this Section 2.5. To be timely, a stockholder’s notice for nominations to be made at a special meeting must be delivered to, or mailed and received at, the principal executive offices of the Corporation not earlier than the one hundred twentieth (120th) day prior to such special meeting and not later than the ninetieth (90th) day prior to such special meeting or, if later, the tenth (10th) day following the day on which public disclosure (as defined in Section 2.4(viii) of these bylaws) of the date of such special meeting was first made. In no event shall any adjournment or postponement of an annual meeting or special meeting or the announcement thereof commence a new time period for the giving of a stockholder’s notice as described above.

(iii) To be in proper form for purposes of this Section 2.5, a stockholder’s notice to the Secretary shall set forth:

(a) As to each Nominating Person (as defined below), the Stockholder Information (as defined in Section 2.4(iii)(a) of these bylaws) except that for purposes of this Section 2.5, the term “Nominating Person” shall be substituted for the term “Proposing Person” in all places it appears in Section 2.4(iii)(a);

(b) As to each Nominating Person, any Disclosable Interests (as defined in Section 2.4(iii)(b), except that for purposes of this Section 2.5 the term “Nominating Person” shall be substituted for the term “Proposing Person” in all places it appears in Section 2.4(iii)(b) and the disclosure with respect to the business to be brought before the meeting in Section 2.4(iii)(b) shall be made with respect to the election of directors at the meeting);

(c) As to each person whom a Nominating Person proposes to nominate for election as a director, (A) all information with respect to such proposed nominee that would be required to be set forth in a stockholder's notice pursuant to this Section 2.5 if such proposed nominee were a Nominating Person, (B) all information relating to such proposed nominee that is required to be disclosed in a proxy statement or other filings required to be made in connection with solicitations of proxies for election of directors in a contested election pursuant to Section 14(a) under the Exchange Act (including such proposed nominee's written consent to being named in the proxy statement as a nominee and to serving as a director if elected), (C) a description of any direct or indirect material interest in any material contract or agreement between or among any Nominating Person, on the one hand, and each proposed nominee or his or her respective associates or any other participants in such solicitation, on the other hand, including, without limitation, all information that would be required to be disclosed pursuant to Item 404 under Regulation S-K if such Nominating Person were the "registrant" for purposes of such rule and the proposed nominee were a director or executive officer of such registrant (the disclosures to be made pursuant to the foregoing clauses (A) through (C) are referred to as "Nominee Information"), and (D) a completed and signed questionnaire, representation and agreement as provided in Section 2.5(vi); and

(d) The Corporation may require any proposed nominee to furnish such other information (A) as may reasonably be required by the Corporation to determine the eligibility of such proposed nominee to serve as an independent director of the Corporation in accordance with the Corporation's Corporate Governance Guidelines or (B) that could be material to a reasonable stockholder's understanding of the independence or lack of independence of such proposed nominee.

(iv) For purposes of this Section 2.5, the term "Nominating Person" shall mean (a) the stockholder providing the notice of the nomination proposed to be made at the meeting, (b) the beneficial owner or beneficial owners, if different, on whose behalf the notice of the nomination proposed to be made at the meeting is made and (c) any associate of such stockholder or beneficial owner or any other participant in such solicitation.

(v) A stockholder providing notice of any nomination proposed to be made at a meeting shall further update and supplement such notice, if necessary, so that the information provided or required to be provided in such notice pursuant to this Section 2.5 shall be true and correct as of the record date for notice of the meeting and as of the date that is ten (10) business days prior to the meeting or any adjournment or postponement thereof, and such update and supplement shall be delivered to, or mailed and received by, the Secretary at the principal executive offices of the Corporation not later than five (5) business days after the record date for notice of the meeting

(in the case of the update and supplement required to be made as of such record date), and not later than eight (8) business days prior to the date for the meeting or, if practicable, any adjournment or postponement thereof (and, if not practicable, on the first practicable date prior to the date to which the meeting has been adjourned or postponed) (in the case of the update and supplement required to be made as of ten (10) business days prior to the meeting or any adjournment or postponement thereof).

(vi) To be eligible to be a nominee for election as a director of the Corporation at an annual or special meeting, the proposed nominee must be nominated in the manner prescribed in Section 2.5 and must deliver (in accordance with the time period prescribed for delivery in a notice to such proposed nominee given by or on behalf of the Board), to the Secretary at the principal executive offices of the Corporation, (a) a completed written questionnaire (in a form provided by the Corporation) with respect to the background, qualifications, stock ownership and independence of such proposed nominee and (b) a written representation and agreement (in form provided by the Corporation) that such proposed nominee (A) is not and, if elected as a director during his or her term of office, will not become a party to (1) any agreement, arrangement or understanding with, and has not given and will not give any commitment or assurance to, any person or entity as to how such proposed nominee, if elected as a director of the Corporation, will act or vote on any issue or question (a "Voting Commitment") or (2) any Voting Commitment that could limit or interfere with such proposed nominee's ability to comply, if elected as a director of the Corporation, with such proposed nominee's fiduciary duties under applicable law, (B) is not, and will not become a party to, any agreement, arrangement or understanding with any person or entity other than the Corporation with respect to any direct or indirect compensation or reimbursement for service as a director and (C) if elected as a director of the Corporation, will comply with all applicable corporate governance, conflict of interest, confidentiality, stock ownership and trading and other policies and guidelines of the Corporation applicable to directors and in effect during such person's term in office as a director (and, if requested by any proposed nominee, the Secretary of the Corporation shall provide to such proposed nominee all such policies and guidelines then in effect).

(vii) In addition to the requirements of this Section 2.5 with respect to any nomination proposed to be made at a meeting, each Proposing Person shall comply with all applicable requirements of the Exchange Act with respect to any such nominations.

(viii) No proposed nominee shall be eligible for nomination as a director of the Corporation unless such proposed nominee and the Nominating Person seeking to place such proposed nominee's name in nomination have complied with this Section 2.5, as applicable. The presiding officer at the meeting shall, if the facts warrant, determine that a nomination was not properly made in accordance with this Section 2.5, and if he or she should so determine, he or she shall so declare such determination to the meeting, the defective nomination shall be disregarded and any ballots cast for the proposed nominee in question (but in the case of any form of ballot listing other qualified nominees, only the ballots cast for the nominee in question) shall be void and of no force or effect.

(ix) Notwithstanding anything in these Bylaws to the contrary, no candidate for nomination shall be eligible to be seated as a director of the Corporation unless nominated and elected in accordance with this Section 2.5.

2.6 MEETINGS.

Unless otherwise provided by law, the Certificate of Incorporation or these bylaws, the notice of any meeting of stockholders shall be sent or otherwise given in accordance with either Section 2.7 or Section 8.1 of these bylaws not less than ten (10) nor more than sixty (60) days before the date of the meeting to each stockholder entitled to vote at such meeting. The notice shall specify the place, if any, date and hour of the meeting, the means of remote communication, if any, by which stockholders and proxy holders may be deemed to be present in person and vote at such meeting, and, in the case of a special meeting, the purpose or purposes for which the meeting is called.

2.7 MANNER OF GIVING NOTICE; AFFIDAVIT OF NOTICE.

Notice of any meeting of stockholders shall be deemed given:

(i) if mailed, when deposited in the U.S. mail, postage prepaid, directed to the stockholder at his or her address as it appears on the Corporation's records; or

(ii) if electronically transmitted as provided in Section 8.1 of these bylaws.

An affidavit of the secretary or an assistant secretary of the Corporation or of the transfer agent or any other agent of the Corporation that the notice has been given by mail or by a form of electronic transmission, as applicable, shall, in the absence of fraud, be prima facie evidence of the facts stated therein.

2.8 QUORUM.

Unless otherwise provided by law, the Certificate of Incorporation or these bylaws, the holders of a majority in voting power of the stock issued and outstanding and entitled to vote, present in person, or by remote communication, if applicable, or represented by proxy, shall constitute a quorum for the transaction of business at all meetings of the stockholders. If, however, a quorum is not present or represented at any meeting of the stockholders, then either (i) the chairperson of the meeting or (ii) a majority in voting power of the stockholders entitled to vote at the meeting, present in person, or by remote communication, if applicable, or represented by proxy, shall have power to adjourn the meeting from time to time in the manner provided in Section 2.9 of these bylaws until a quorum is present or represented. At such adjourned meeting at which a quorum is present or represented, any business may be transacted that might have been transacted at the meeting as originally noticed.

2.9 ADJOURNED MEETING; NOTICE.

When a meeting is adjourned to another time or place, unless these bylaws otherwise require, notice need not be given of the adjourned meeting if the time, place, if any, thereof, and the means of remote communications, if any, by which stockholders and proxy holders may be deemed to be present in person and vote at such adjourned meeting are announced at the meeting at which the adjournment is taken. At the adjourned meeting, the Corporation may transact any business which might have been transacted at the original meeting. If the adjournment is for more than thirty (30) days, or if after the adjournment a new record date is fixed for the adjourned meeting, a notice of the adjourned meeting shall be given to each stockholder of record entitled to vote at the meeting.

2.10 CONDUCT OF BUSINESS.

The date and time of the opening and the closing of the polls for each matter upon which the stockholders will vote at a meeting shall be announced at the meeting by the chair of the meeting. The Board may adopt by resolution such rules and regulations for the conduct of the meeting of stockholders as it shall deem appropriate. Except to the extent inconsistent with such rules and regulations as adopted by the Board, the chair of any meeting of stockholders shall have the right and authority to convene and (for any or no reason) to recess and/or adjourn the meeting, to prescribe such rules, regulations and procedures (which need not be in writing) and to do all such acts as, in the judgment of such chair of the meeting, are appropriate for the proper conduct of the meeting. Such rules, regulations or procedures, whether adopted by the Board or prescribed by the chair of the meeting, may include, without limitation, the following: (i) the establishment of an agenda or order of business for the meeting; (ii) rules and procedures for maintaining order at the meeting and the safety of those present (including, without limitation, rules and procedures for removal of disruptive persons from the meeting); (iii) limitations on attendance at or participation in the meeting to stockholders entitled to vote at the meeting, their duly authorized and constituted proxies or such other persons as the presiding person of the meeting shall determine; (iv) restrictions on entry to the meeting after the time fixed for the commencement thereof; and (v) limitations on the time allotted to questions or comments by participants. The chair of any meeting of stockholders, in addition to making any other determinations that may be appropriate to the conduct of the meeting (including, without limitation, determinations with respect to the administration and/or interpretation of any of the rules, regulations or procedures of the meeting, whether adopted by the Board or prescribed by the person presiding over the meeting), shall, if the facts warrant, determine and declare to the meeting that a matter or business was not properly brought before the meeting and if such chair of the meeting should so determine, such chair of the meeting shall so declare to the meeting and any such matter or business not properly brought before the meeting shall not be transacted or considered. Unless and to the extent determined by the Board or the chair of the meeting, meetings of stockholders shall not be required to be held in accordance with the rules of parliamentary procedure.

2.11 VOTING.

The stockholders entitled to vote at any meeting of stockholders shall be determined in accordance with the provisions of Section 2.13 of these bylaws, subject to Section 217 (relating to voting rights of fiduciaries, pledgors and joint owners of stock) and Section 218 (relating to voting trusts and other voting agreements) of the DGCL.

Except as may be otherwise provided in the Certificate of Incorporation or these bylaws, each stockholder entitled to vote at a meeting of stockholders shall be entitled to one (1) vote for each share of capital stock held by such stockholder which has voting power upon the matter in question.

At all duly called or convened meetings of stockholders, at which a quorum is present, for the election of directors, a plurality of the votes cast shall be sufficient to elect a director. Except as otherwise provided by the Certificate of Incorporation, these bylaws, the rules or regulations of any stock exchange applicable to the Corporation, or applicable law or pursuant to any regulation applicable to the Corporation or its securities, all other elections and questions presented to the stockholders at a duly called or convened meeting, at which a quorum is present, shall be decided by the majority of the votes cast affirmatively or negatively (excluding abstentions and broker non-votes) and shall be valid and binding upon the Corporation.

2.12 NO STOCKHOLDER ACTION BY WRITTEN CONSENT WITHOUT A MEETING.

Subject to the rights of the holders of the shares of any series of Preferred Stock or any other class of stock or series thereof having a preference over the Common Stock as to dividends or upon liquidation, and except as otherwise provided in the Certificate of Incorporation, any action required or permitted to be taken by the stockholders of the Corporation must be effected at a duly called annual or special meeting of stockholders of the Corporation and may not be effected by any consent in writing by such stockholders.

2.13 RECORD DATE FOR STOCKHOLDER NOTICE; VOTING; GIVING CONSENTS.

In order that the Corporation may determine the stockholders entitled to notice of or to vote at any meeting of stockholders or any adjournment thereof, or entitled to receive payment of any dividend or other distribution or allotment of any rights, or entitled to exercise any rights in respect of any change, conversion or exchange of stock or for the purpose of any other lawful action, the Board may fix, in advance, a record date, which record date shall not precede the date on which the resolution fixing the record date is adopted and which shall not be more than sixty (60) nor less than ten (10) days before the date of such meeting, nor more than sixty (60) days prior to any other such action.

If the Board does not so fix a record date:

(i) The record date for determining stockholders entitled to notice of or to vote at a meeting of stockholders shall be at the close of business on the day next preceding the day on which notice is given, or, if notice is waived, at the close of business on the day next preceding the day on which the meeting is held.

(ii) The record date for determining stockholders for any other purpose shall be at the close of business on the day on which the Board adopts the resolution relating thereto.

A determination of stockholders of record entitled to notice of or to vote at a meeting of stockholders shall apply to any adjournment of the meeting; *provided, however*, that the Board may fix a new record date for the adjourned meeting.

2.14 PROXIES.

Each stockholder entitled to vote at a meeting of stockholders may authorize another person or persons to act for such stockholder by proxy authorized by an instrument in writing or by a transmission permitted by law filed in accordance with the procedure established for the meeting, but no such proxy shall be voted or acted upon after three (3) years from its date, unless the proxy provides for a longer period. The revocability of a proxy that states on its face that it is irrevocable shall be governed by the provisions of Section 212 of the DGCL. A proxy may be in the form of electronic transmission which sets forth or is submitted with information from which it can be determined that the transmission was authorized by the stockholder.

2.15 LIST OF STOCKHOLDERS ENTITLED TO VOTE.

The Corporation shall prepare, at least ten (10) days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting, arranged in alphabetical order, and showing the address of each stockholder and the number of shares registered in the name of each stockholder. The Corporation shall not be required to include electronic mail addresses or other electronic contact information on such list. Such list shall be open to the examination of any stockholder, for any purpose germane to the meeting for a period of at least ten (10) days prior to the meeting: (i) on a reasonably accessible electronic network, provided that the information required to gain access to such list is provided with the notice of the meeting, or (ii) during ordinary business hours, at the Corporation's principal executive office. In the event that the Corporation determines to make the list available on an electronic network, the Corporation may take reasonable steps to ensure that such information is available only to stockholders of the Corporation. If the meeting is to be held at a place, then the list shall be produced and kept at the time and place of the meeting during the whole time thereof, and may be inspected by any stockholder who is present. If the meeting is to be held solely by means of remote communication, then the list shall also be open to the examination of any stockholder during the whole time of the meeting on a reasonably accessible electronic network, and the information required to access such list shall be provided with the notice of the meeting. Such list shall presumptively determine the identity of the stockholders entitled to vote at the meeting and the number of shares held by each of them. Except as otherwise provided by law, the stock ledger shall be the only evidence as to who are the stockholders entitled to examine the list of stockholders required by this Section 2.15 or to vote in person or by proxy at any meeting of stockholders.

2.16 INSPECTORS OF ELECTION.

Before any meeting of stockholders, the Board shall appoint an inspector or inspectors of election to act at the meeting or its adjournment and make a written report thereof. The number of inspectors shall be either one (1) or three (3). If any person appointed as inspector fails to appear or fails or refuses to act, then the chairperson of the meeting may, and upon the request of any stockholder or a stockholder's proxy shall, appoint a person to fill that vacancy.

Such inspectors shall:

- (i) ascertain the number of shares of capital stock of the corporation outstanding and the voting power of each such share;
- (ii) determine the shares of capital stock of the corporation represented at the meeting and the validity of proxies and ballots;
- (iii) count all votes and ballots;
- (iv) determine and retain for a reasonable period a record of the disposition of any challenges made to any determination by the inspectors;

and

(v) certify their determination of the number of shares of capital stock of the corporation represented at the meeting and such inspectors' count of all votes and ballots.

(vi) The inspectors of election shall perform their duties impartially, in good faith, to the best of their ability and as expeditiously as is practical. If there are three (3) inspectors of election, the decision, act or certificate of a majority is effective in all respects as the decision, act or certificate of all. Any report or certificate made by the inspectors of election is prima facie evidence of the facts stated therein. The inspectors of election may appoint such persons to assist them in performing their duties as they determine.

ARTICLE III - DIRECTORS

3.1 POWERS.

Subject to the provisions of the DGCL and any limitations in the Certificate of Incorporation, the business and affairs of the Corporation shall be managed and all corporate powers shall be exercised by or under the direction of the Board.

3.2 NUMBER OF DIRECTORS.

The authorized number of directors shall be determined from time to time by resolution of the Board, provided the Board shall consist of at least one member. No reduction of the authorized number of directors shall have the effect of removing any director before that director's term of office expires.

3.3 ELECTION, QUALIFICATION AND TERM OF OFFICE OF DIRECTORS.

Except as provided in Section 3.4 of these bylaws, each director, including a director elected to fill a vacancy, shall hold office until the expiration of the term for which elected and until such director's successor is elected and qualified or until such director's earlier death, resignation or removal. Directors need not be stockholders unless so required by the Certificate of Incorporation or these bylaws. The Certificate of Incorporation or these bylaws may prescribe other qualifications for directors.

As provided in the Certificate of Incorporation, the directors of the Corporation shall be divided into three (3) classes.

3.4 RESIGNATION AND VACANCIES.

Any director may resign at any time upon notice given in writing or by electronic transmission to the Corporation. The resignation shall take effect at the time specified therein or upon the happening of an event specified therein, and if no time or event is specified, at the time of its receipt. When one or more directors so resigns and the resignation is effective at a future date or upon the happening of an event to occur on a future date, a majority of the directors then in office, including those who have so resigned, shall have power to fill such vacancy or vacancies, the vote thereon to take effect when such resignation or resignations shall become effective, and each director so chosen shall hold office as provided in this section in the filling of other vacancies.

Unless otherwise provided in the Certificate of Incorporation or these bylaws, vacancies and newly created directorships resulting from any increase in the authorized number of directors shall, unless the Board determines by resolution that any such vacancies or newly created directorships shall be filled by stockholders, be filled only by a majority of the directors then in office, although less than a quorum, or by a sole remaining director. Any director elected in accordance with the preceding sentence shall hold office for the remainder of the full term of the director for which the vacancy was created or occurred and until such director's successor shall have been elected and qualified. A vacancy in the Board of Directors shall be deemed to exist under these bylaws in the case of the death, removal or resignation of any director.

3.5 PLACE OF MEETINGS; MEETINGS BY TELEPHONE .

The Board may hold meetings, both regular and special, either within or outside the State of Delaware.

Unless otherwise restricted by the Certificate of Incorporation or these bylaws, members of the Board, or any committee designated by the Board, may participate in a meeting of the Board, or any committee, by means of conference telephone or other communications equipment by means of which all persons participating in the meeting can hear each other, and such participation in a meeting pursuant to this bylaw shall constitute presence in person at the meeting.

3.6 REGULAR MEETINGS.

Regular meetings of the Board may be held without notice at such time and at such place as shall from time to time be determined by the Board.

3.7 SPECIAL MEETINGS; NOTICE.

Special meetings of the Board for any purpose or purposes may be called at any time by the chairperson of the Board, the chief executive officer, the president, the secretary or a majority of the authorized number of directors.

Notice of the time and place of special meetings shall be:

- (i) delivered personally by hand, by courier or by telephone;
- (ii) sent by United States first-class mail, postage prepaid;
- (iii) sent by facsimile or electronic mail; or
- (iv) sent by other means of electronic transmission,

directed to each director at that director's address, telephone number, facsimile number or electronic mail address, as the case may be, as shown on the Corporation's records.

If the notice is (i) delivered personally by hand, by courier or by telephone, (ii) sent by facsimile or electronic mail, or (iii) sent by other means of electronic transmission, it shall be delivered or sent at least twenty-four (24) hours before the time of the holding of the meeting. If the notice is sent by U.S. mail, it shall be deposited in the U.S. mail at least four (4) days before the time of the holding of the meeting. Any oral notice may be communicated to the director. The notice need not specify the place of the meeting (if the meeting is to be held at the Corporation's principal executive office) nor the purpose of the meeting.

3.8 QUORUM.

At all meetings of the Board, a majority of the authorized number of directors shall constitute a quorum for the transaction of business. The vote of a majority of the directors present at any meeting at which a quorum is present shall be the act of the Board, except as may be otherwise specifically provided by statute, the Certificate of Incorporation or these bylaws. If a quorum is not present at any meeting of the Board, then the directors present thereat may adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum is present.

3.9 BOARD ACTION BY WRITTEN CONSENT WITHOUT A MEETING.

Unless otherwise restricted by the Certificate of Incorporation or these bylaws, any action required or permitted to be taken at any meeting of the Board, or of any committee thereof, may be taken without a meeting if all members of the Board or committee, as the case may be, consent thereto in writing or by electronic transmission and the writing or writings or electronic transmission or transmissions are filed with the minutes of proceedings of the Board or committee. Such filing shall be in paper form if the minutes are maintained in paper form and shall be in electronic form if the minutes are maintained in electronic form.

3.10 FEES AND COMPENSATION OF DIRECTORS.

Unless otherwise restricted by the Certificate of Incorporation or these bylaws, the Board shall have the authority to fix the compensation, including fees and reimbursements of expenses, of directors for services to the Corporation in any capacity.

3.11 REMOVAL OF DIRECTORS.

Except as otherwise provided by the DGCL or the Certificate of Incorporation, the Board of Directors or any individual director may be removed from office at any time, but only with cause by the affirmative vote of the holders of at least sixty six and two thirds percent (66-2/3%) of the voting power of all the then outstanding shares of voting stock of the Corporation with the power to vote at an election of directors (the "Voting Stock").

No reduction of the authorized number of directors shall have the effect of removing any director prior to the expiration of such director's term of office.

ARTICLE IV - COMMITTEES

4.1 COMMITTEES OF DIRECTORS.

The Board may designate one (1) or more committees, each committee to consist of one (1) or more of the directors of the Corporation. The Board may designate one (1) or more directors as alternate members of any committee, who may replace any absent or disqualified member at any meeting of the committee. In the absence or disqualification of a member of a committee, the member or members thereof present at any meeting and not disqualified from voting, whether or not such member or members constitute a quorum, may unanimously appoint another member of the Board to act at the meeting in the place of any such absent or disqualified member. Any such committee, to the extent provided in the resolution of the Board or in these bylaws, shall have and may exercise all the powers and authority of the Board in the management of the business and affairs of the Corporation, and may authorize the seal of the Corporation to be affixed to all papers that may require it; but no such committee shall have the power or authority to (i) approve or adopt, or recommend to the stockholders, any action or matter expressly required by the DGCL to be submitted to stockholders for approval, or (ii) adopt, amend or repeal any bylaw of the Corporation.

4.2 COMMITTEE MINUTES.

Each committee shall keep regular minutes of its meetings and report the same to the Board when required.

4.3 MEETINGS AND ACTION OF COMMITTEES.

Meetings and actions of committees shall be governed by, and held and taken in accordance with, the provisions of:

- (i) Section 3.5 (place of meetings and meetings by telephone);
- (ii) Section 3.6 (regular meetings);
- (iii) Section 3.7 (special meetings and notice);
- (iv) Section 3.8 (quorum);
- (v) Section 3.9 (action without a meeting); and
- (vi) Section 7.12 (waiver of notice),

with such changes in the context of those bylaws as are necessary to substitute the committee and its members for the Board and its members. *However:*

- (i) the time of regular meetings of committees may be determined either by resolution of the Board or by resolution of the committee;
- (ii) special meetings of committees may also be called by resolution of the Board or the chairperson of the applicable committee;
- (iii) notice of special meetings of committees shall also be given to all alternate members, who shall have the right to attend all meetings of the committee; and
- (iv) the Board may adopt rules for the governance of any committee to override the provisions that would otherwise apply to the committee pursuant to this Section 4.3, provided that such rules do not violate the provisions of the Certificate of Incorporation or applicable law.

ARTICLE V - OFFICERS

5.1 OFFICERS.

The officers of the Corporation shall be a president and a secretary. The Corporation may also have, at the discretion of the Board, a chairperson of the Board, a vice chairperson of the Board, a chief executive officer, a chief financial officer or treasurer, one (1) or more vice presidents, one (1) or more assistant vice presidents, one (1) or more assistant treasurers, one (1) or more assistant secretaries, and any such other officers as may be appointed in accordance with the provisions of these bylaws. Any number of offices may be held by the same person.

5.2 APPOINTMENT OF OFFICERS.

The Board shall appoint the officers of the Corporation, except such officers as may be appointed in accordance with the provisions of Section 5.3 of these bylaws, subject to the rights, if any, of an officer under any contract of employment.

5.3 SUBORDINATE OFFICERS.

The Board may appoint, or empower the chief executive officer or, in the absence of a chief executive officer, the president, to appoint, such other officers and agents as the business of the Corporation may require. Each of such officers and agents shall hold office for such period, have such authority, and perform such duties as are provided in these bylaws or as the Board may from time to time determine.

5.4 REMOVAL AND RESIGNATION OF OFFICERS.

Subject to the rights, if any, of an officer under any contract of employment, any officer may be removed, either with or without cause, by an affirmative vote of the majority of the Board at any regular or special meeting of the Board or, except in the case of an officer chosen by the Board, by any officer upon whom such power of removal may be conferred by the Board.

Any officer may resign at any time by giving written notice to the Corporation. Any resignation shall take effect at the date of the receipt of that notice or at any later time specified in that notice. Unless otherwise specified in the notice of resignation, the acceptance of the resignation shall not be necessary to make it effective. Any resignation is without prejudice to the rights, if any, of the Corporation under any contract to which the officer is a party.

5.5 VACANCIES IN OFFICES.

Any vacancy occurring in any office of the Corporation shall be filled by the Board or as provided in Section 5.2.

5.6 REPRESENTATION OF SHARES OF OTHER CORPORATIONS.

The chairperson of the Board, the chief executive officer, the president, any vice president, the treasurer, the secretary or assistant secretary of this Corporation, or any other person authorized by the Board, the chief executive officer, the president or a vice president, is authorized to vote, represent and exercise on behalf of this Corporation all rights incident to any and all shares of any other corporation or corporations standing in the name of this Corporation. The authority granted herein may be exercised either by such person directly or by any other person authorized to do so by proxy or power of attorney duly executed by such person having the authority.

5.7 AUTHORITY AND DUTIES OF OFFICERS.

All officers of the Corporation shall respectively have such authority and perform such duties in the management of the business of the Corporation as may be designated from time to time by the Board or the stockholders and, to the extent not so provided, as generally pertain to their respective offices, subject to the control of the Board.

ARTICLE VI - RECORDS AND REPORTS

6.1 MAINTENANCE AND INSPECTION OF RECORDS.

The Corporation shall, either at its principal executive office or at such place or places as designated by the Board, keep a record of its stockholders listing their names and addresses and the number and class of shares held by each stockholder, a copy of these bylaws as amended to date, accounting books and other records.

Any stockholder of record, in person or by attorney or other agent, shall, upon written demand under oath stating the purpose thereof, have the right during the usual hours for business to inspect for any proper purpose the Corporation's stock ledger, a list of its stockholders, and its other books and records and to make copies or extracts therefrom. A proper purpose shall mean a purpose reasonably related to such person's interest as a stockholder. In every instance where an attorney or other agent is the person who seeks the right to inspection, the demand under oath shall be accompanied by a power of attorney or such other writing that authorizes the attorney or other agent so to act on behalf of the stockholder. The demand under oath shall be directed to the Corporation at its registered office in Delaware or at its principal executive office.

6.2 INSPECTION BY DIRECTORS.

Any director shall have the right to examine the Corporation's stock ledger, a list of its stockholders, and its other books and records for a purpose reasonably related to his or her position as a director to the extent such director is entitled to do so under Section 220 of the DGCL.

The Court of Chancery is hereby vested with the exclusive jurisdiction to determine whether a director is entitled to the inspection sought. The Court may summarily order the Corporation to permit the director to inspect any and all books and records, the stock ledger, and the stock list and to make copies or extracts therefrom. The Court may, in its discretion, prescribe any limitations or conditions with reference to the inspection, or award such other and further relief as the Court may deem just and proper.

ARTICLE VII - GENERAL MATTERS

7.1 EXECUTION OF CORPORATE CONTRACTS AND INSTRUMENTS.

The Board, except as otherwise provided in these bylaws, may authorize any officer or officers, or agent or agents, to enter into any contract or execute any instrument in the name of and on behalf of the Corporation; such authority may be general or confined to specific instances. Unless so authorized or ratified by the Board or within the agency power of an officer, no officer, agent or employee shall have any power or authority to bind the Corporation by any contract or engagement or to pledge its credit or to render it liable for any purpose or for any amount.

7.2 STOCK CERTIFICATES; PARTLY PAID SHARES.

The shares of the Corporation shall be represented by certificates, provided that the Board may provide by resolution that some or all of any or all classes or series of stock shall be uncertificated shares. Any such resolution shall not apply to shares represented by a certificate until such certificate is surrendered to the corporation. Certificates for the shares of stock, if any, shall be in such form as is consistent with the Certificate of Incorporation and applicable law. Every holder of stock represented by a certificate shall be entitled to have a certificate signed by, or in the name of the Corporation by any two authorized officers of the Corporation (it being understood that each of the chairperson or vice-chairperson of the Board, or the president or vice-president, and by the treasurer or an assistant treasurer, or the secretary or an assistant secretary of the Corporation shall be an authorized officer for such purpose), representing the number of shares registered in certificate form. Any or all of the signatures on the certificate may be a facsimile. In case any officer, transfer agent or registrar who has signed or whose facsimile signature has been placed upon a certificate has ceased to be such officer, transfer agent or registrar before such certificate is issued, it may be issued by the Corporation with the same effect as if he or she were such officer, transfer agent or registrar at the date of issue.

The Corporation may issue the whole or any part of its shares as partly paid and subject to call for the remainder of the consideration to be paid therefor. Upon the face or back of each stock certificate issued to represent any such partly paid shares, upon the books and records of the Corporation in the case of uncertificated partly paid shares, the total amount of the consideration to be paid therefor and the amount paid thereon shall be stated. Upon the declaration of any dividend on fully paid shares, the Corporation shall declare a dividend upon partly paid shares of the same class, but only upon the basis of the percentage of the consideration actually paid thereon.

7.3 SPECIAL DESIGNATION ON CERTIFICATES.

If the Corporation is authorized to issue more than one class of stock or more than one series of any class, then the powers, the designations, the preferences and the relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights shall be set forth in full or summarized on the face or back of the certificate that the Corporation shall issue to represent such class or series of stock; *provided, however*, that, except as otherwise provided in Section 202 of the DGCL, in lieu of the foregoing requirements, there may be set forth on the face or back of the certificate that the Corporation shall issue to represent such class or series of stock a statement that the Corporation will furnish without charge to each stockholder who so requests the powers, the designations, the preferences and the relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights.

7.4 LOST CERTIFICATES.

Except as provided in this Section 7.4, no new certificates for shares shall be issued to replace a previously issued certificate unless the latter is surrendered to the Corporation and cancelled at the same time. The Corporation may issue a new certificate of stock or uncertificated shares in the place of any certificate theretofore issued by it, alleged to have been lost, stolen or destroyed, and the Corporation may require the owner of the lost, stolen or destroyed certificate, or such owner's legal representative, to give the Corporation a bond sufficient to indemnify it against any claim that may be made against it on account of the alleged loss, theft or destruction of any such certificate or the issuance of such new certificate or uncertificated shares.

7.5 CONSTRUCTION; DEFINITIONS.

Unless the context requires otherwise, the general provisions, rules of construction and definitions in the DGCL shall govern the construction of these bylaws. Without limiting the generality of this provision, the singular number includes the plural, the plural number includes the singular, and the term "person" includes both a corporation and a natural person.

7.6 DIVIDENDS.

The Board, subject to any restrictions contained in either (i) the DGCL or (ii) the Certificate of Incorporation, may declare and pay dividends upon the shares of its capital stock. Dividends may be paid in cash, in property or in shares of the Corporation's capital stock.

The Board may set apart out of any of the funds of the Corporation available for dividends a reserve or reserves for any proper purpose and may abolish any such reserve. Such purposes shall include but not be limited to equalizing dividends, repairing or maintaining any property of the Corporation, and meeting contingencies.

7.7 FISCAL YEAR.

The fiscal year of the Corporation shall be fixed by resolution of the Board and may be changed by the Board.

7.8 SEAL.

The Corporation may adopt a corporate seal, which shall be adopted and which may be altered by the Board. The Corporation may use the corporate seal by causing it or a facsimile thereof to be impressed or affixed or in any other manner reproduced.

7.9 TRANSFER OF STOCK.

Shares of the Corporation shall be transferable in the manner prescribed by law and in these bylaws. Shares of stock of the Corporation shall be transferred on the books of the Corporation only by the holder of record thereof or by such holder's attorney duly authorized in writing, upon surrender to the Corporation of the certificate or certificates representing such shares endorsed by the appropriate person or persons (or by delivery of duly executed instructions with respect to uncertificated shares), with such evidence of the authenticity of such endorsement or execution, transfer, authorization and other matters as the Corporation may reasonably require, and accompanied by all necessary stock transfer stamps. No transfer of stock shall be valid as against the Corporation for any purpose until it shall have been entered in the stock records of the Corporation by an entry showing the names of the persons from and to whom it was transferred.

7.10 STOCK TRANSFER AGREEMENTS.

The Corporation shall have power to enter into and perform any agreement with any number of stockholders of any one or more classes of stock of the Corporation to restrict the transfer of shares of stock of the Corporation of any one or more classes owned by such stockholders in any manner not prohibited by the DGCL.

7.11 REGISTERED STOCKHOLDERS.

The Corporation:

(i) shall be entitled to recognize the exclusive right of a person registered on its books as the owner of shares to receive dividends and to vote as such owner; and

(ii) shall not be bound to recognize any equitable or other claim to or interest in such share or shares on the part of another person, whether or not it shall have express or other notice thereof, except as otherwise provided by the laws of Delaware.

7.12 WAIVER OF NOTICE.

Whenever notice is required to be given under any provision of the DGCL, the Certificate of Incorporation or these bylaws, a written waiver, signed by the person entitled to notice, or a waiver by electronic transmission by the person entitled to notice, whether before or after the time of the event for which notice is to be given, shall be deemed equivalent to notice. Attendance of a person at a meeting shall constitute a waiver of notice of such meeting, except when the person attends a meeting for the express purpose of objecting at the beginning of the meeting, to the transaction of any business because the meeting is not lawfully called or convened. Neither the business to be transacted at, nor the purpose of, any regular or special meeting of the stockholders need be specified in any written waiver of notice or any waiver by electronic transmission unless so required by the Certificate of Incorporation or these bylaws.

ARTICLE VIII - NOTICE BY ELECTRONIC TRANSMISSION

8.1 DELIVERY OF NOTICE; NOTICE BY ELECTRONIC TRANSMISSION.

Without limiting the manner by which notice otherwise may be given effectively to stockholders, any notice to stockholders given by the Corporation under any provisions of the DGCL, the Certificate of Incorporation, or these bylaws may be given in writing directed to the stockholder's mailing address (or by electronic transmission directed to the stockholder's electronic mail address, as applicable) as it appears on the records of the Corporation and shall be given (1) if mailed, when the notice is deposited in the U.S. mail, postage prepaid, (2) if delivered by courier service, the earlier of when the notice is received or left at such stockholder's address or (3) if given by electronic mail, when directed to such stockholder's electronic mail address unless the stockholder has notified the Corporation in writing or by electronic transmission of an objection to receiving notice by electronic mail. A notice by electronic mail must include a prominent legend that the communication is an important notice regarding the Corporation.

Without limiting the manner by which notice otherwise may be given effectively to stockholders, any notice to stockholders given by the Corporation under any provision of the DGCL, the Certificate of Incorporation or these bylaws shall be effective if given by a form of electronic transmission consented to by the stockholder to whom the notice is given. Any such consent shall be revocable by the stockholder by written notice or electronic transmission to the Corporation. Notwithstanding the provisions of this paragraph, the Corporation may give a notice by electronic mail in accordance with the first paragraph of this section without obtaining the consent required by this paragraph.

Any notice given pursuant to the preceding paragraph shall be deemed given:

- (i) if by facsimile telecommunication, when directed to a number at which the stockholder has consented to receive notice;

(ii) if by a posting on an electronic network together with separate notice to the stockholder of such specific posting, upon the later of (A) such posting and (B) the giving of such separate notice; and

(iii) if by any other form of electronic transmission, when directed to the stockholder.

Notwithstanding the foregoing, a notice may not be given by an electronic transmission from and after the time that (1) the Corporation is unable to deliver by such electronic transmission two (2) consecutive notices given by the Corporation and (2) such inability becomes known to the Secretary or an Assistant Secretary of the Corporation or to the transfer agent, or other person responsible for the giving of notice, provided, however, the inadvertent failure to discover such inability shall not invalidate any meeting or other action.

An affidavit of the Secretary or an Assistant Secretary or of the transfer agent or other agent of the Corporation that the notice has been given shall, in the absence of fraud, be prima facie evidence of the facts stated therein.

ARTICLE IX - INDEMNIFICATION

9.1 INDEMNIFICATION OF DIRECTORS AND OFFICERS.

The Corporation shall indemnify and hold harmless, to the fullest extent permitted by the DGCL as it presently exists or may hereafter be amended, any director or officer of the Corporation who was or is made or is threatened to be made a party or is otherwise involved in any action, suit or proceeding, whether civil, criminal, administrative or investigative (a "Proceeding") by reason of the fact that he or she, or a person for whom he or she is the legal representative, is or was a director or officer of the Corporation or is or was serving at the request of the Corporation as a director, officer, employee or agent of another corporation or of a partnership, joint venture, trust, enterprise or non-profit entity, including service with respect to employee benefit plans, against all liability and loss suffered and expenses (including attorneys' fees, judgments, fines, ERISA excise taxes or penalties and amounts paid in settlement) reasonably incurred by such person in connection with any such Proceeding. Notwithstanding the preceding sentence, except as otherwise provided in Section 9.4, the Corporation shall be required to indemnify a person in connection with a Proceeding initiated by such person only if the Proceeding was authorized in the specific case by the Board.

9.2 INDEMNIFICATION OF OTHERS.

The Corporation shall have the power to indemnify and hold harmless, to the fullest extent permitted by applicable law as it presently exists or may hereafter be amended, any employee or agent of the Corporation who was or is made or is threatened to be made a party or is otherwise involved in any Proceeding by reason of the fact that he or she, or a person for whom he or she is the legal representative, is or was an employee or agent of the Corporation or is or was serving at the request of the Corporation as a director, officer, employee or agent of another corporation or of a partnership, joint venture, trust, enterprise or non-profit entity, including service with respect to employee benefit plans, against all liability and loss suffered and expenses reasonably incurred by such person in connection with any such Proceeding.

9.3 PREPAYMENT OF EXPENSES.

The Corporation shall to the fullest extent not prohibited by applicable law pay the expenses (including attorneys' fees) incurred by any officer or director of the Corporation, and may pay the expenses incurred by any employee or agent of the Corporation, in defending any Proceeding in advance of its final disposition; *provided, however*, that, to the extent required by law, such payment of expenses in advance of the final disposition of the Proceeding shall be made only upon receipt of an undertaking by the person to repay all amounts advanced if it should be ultimately determined that the person is not entitled to be indemnified under this Article IX or otherwise.

9.4 DETERMINATION; CLAIM.

If a claim for indemnification (following the final disposition of such Proceeding) or advancement of expenses under this Article IX is not paid in full within sixty (60) days after a written claim therefor has been received by the Corporation the claimant may file suit to recover the unpaid amount of such claim and, if successful in whole or in part, shall be entitled to be paid the expense of prosecuting such claim to the fullest extent permitted by law. In any such action the Corporation shall have the burden of proving that the claimant was not entitled to the requested indemnification or payment of expenses under applicable law.

9.5 NON-EXCLUSIVITY OF RIGHTS.

The rights conferred on any person by this Article IX shall not be exclusive of any other rights which such person may have or hereafter acquire under any statute, provision of the Certificate of Incorporation, these bylaws, agreement, vote of stockholders or disinterested directors or otherwise.

9.6 INSURANCE.

The Corporation may purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the Corporation, or is or was serving at the request of the Corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust enterprise or non-profit entity against any liability asserted against him or her and incurred by him or her in any such capacity, or arising out of his or her status as such, whether or not the Corporation would have the power to indemnify him or her against such liability under the provisions of the DGCL.

9.7 OTHER INDEMNIFICATION.

The Corporation's obligation, if any, to indemnify or advance expenses to any person who was or is serving at its request as a director, officer, employee or agent of another corporation, partnership, joint venture, trust, enterprise or non-profit entity shall be reduced by any amount such person may collect as indemnification or advancement of expenses from such other corporation, partnership, joint venture, trust, enterprise or non-profit enterprise.

9.8 CONTINUATION OF INDEMNIFICATION.

The rights to indemnification and to prepayment of expenses provided by, or granted pursuant to, this Article IX shall continue notwithstanding that the person has ceased to be a director or officer of the Corporation and shall inure to the benefit of the estate, heirs, executors, administrators, legatees and distributees of such person.

9.9 AMENDMENT OR REPEAL.

The provisions of this Article IX shall constitute a contract between the Corporation, on the one hand, and, on the other hand, each individual who serves or has served as a director or officer of the Corporation (whether before or after the adoption of these bylaws), in consideration of such person's performance of such services, and pursuant to this Article IX the Corporation intends to be legally bound to each such current or former director or officer of the Corporation. With respect to current and former directors and officers of the Corporation, the rights conferred under this Article IX are present contractual rights and such rights are fully vested, and shall be deemed to have vested fully, immediately upon adoption of these bylaws. With respect to any directors or officers of the Corporation who commence service following adoption of these bylaws, the rights conferred under this provision shall be present contractual rights and such rights shall fully vest, and be deemed to have vested fully, immediately upon such director or officer commencing service as a director or officer of the Corporation. Any repeal or modification of the foregoing provisions of this Article IX shall not adversely affect any right or protection (i) hereunder of any person in respect of any act or omission occurring prior to the time of such repeal or modification or (ii) under any agreement providing for indemnification or advancement of expenses to an officer or director of the Corporation in effect prior to the time of such repeal or modification.

ARTICLE X - AMENDMENTS

Subject to the limitations set forth in Section 9.9 of these bylaws or the provisions of the certificate of incorporation, the Board is expressly empowered to adopt, amend or repeal the bylaws of the Corporation. Any adoption, amendment or repeal of the bylaws of the Corporation by the Board shall require the approval of a majority of the authorized number of directors. The stockholders also shall have power to adopt, amend or repeal the bylaws of the Corporation; *provided, however*, that, in addition to any vote of the holders of any class or series of stock of the Corporation required by law or by the Certificate of Incorporation, such action by stockholders shall require the affirmative vote of the holders of at least sixty-six and two-thirds percent (66-2/3%) of the voting power of all of the then-outstanding shares of the Voting Stock.

ARTICLE XI - FORUM SELECTION

Unless the Corporation consents in writing to the selection of an alternative forum, the Court of Chancery (the "Chancery Court") of the State of Delaware (or, in the event that the Chancery Court does not have jurisdiction, the federal district court for the District of Delaware or other state courts of the State of Delaware) shall, to the fullest extent permitted by law, be the sole and exclusive forum for (i) any derivative action or proceeding brought on behalf of the Corporation, (ii) any action asserting a claim of breach of a fiduciary duty owed by any director, officer, other employee or stockholder of the Corporation to the Corporation or to the Corporation's stockholders, (iii) any action arising pursuant to any provision of the DGCL or the Certificate of Incorporation or these bylaws (as either may be amended from time to time) or (iv) any action asserting a claim against the Corporation governed by the internal affairs doctrine.

Unless the Corporation consents in writing to the selection of an alternate forum, the federal district courts of the United States of America shall be the exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act of 1933, as amended. Any person or entity purchasing or otherwise acquiring any interest in any security of the Corporation shall be deemed to have notice of and consented to this Article XI. Notwithstanding the foregoing, the provisions of this Article XI shall not apply to suits brought to enforce any liability or duty created by the Securities Exchange Act of 1934, as amended, or any other claim for which the federal courts of the United States have exclusive jurisdiction.

If any action the subject matter of which is within the scope of the preceding sentence is filed in a court other than a court located within the State of Delaware (a "Foreign Action") in the name of any stockholder, such stockholder shall be deemed to have consented to (a) the Personal jurisdiction of the state and federal courts located within the State of Delaware in connection with any action brought in any such court to enforce the preceding sentence and (b) having service of process made upon such stockholder in any such action by service upon such stockholder's counsel in the Foreign Action as agent for such stockholder. Any person or entity purchasing or otherwise acquiring or holding any interest in shares of capital stock of the Corporation shall be deemed to have notice of and consented to the provisions of this Article XI.

If any provision or provisions of this Article XI shall be held to be invalid, illegal or unenforceable as applied to any circumstance for any reason whatsoever, (a) the validity, legality and enforceability of such provisions in any other circumstance and of the remaining provisions of this Article XI (including, without limitation, each portion of any paragraph of this Article XI containing any such provision held to be invalid, illegal or unenforceable that is not itself held to be invalid, illegal or unenforceable) shall not in any way be affected or impaired thereby and (b) the application of such provision to other persons or entities and circumstances shall not in any way be affected or impaired thereby.

ARTICLE XII - DEFINITIONS

As used in these bylaws, unless the context otherwise requires, the following terms shall have the following meanings:

An “electronic transmission” means any form of communication, not directly involving the physical transmission of paper, including the use of, or participation in, one or more electronic networks or databases (including one or more distributed electronic networks or databases), that creates a record that may be retained, retrieved and reviewed by a recipient thereof, and that may be directly reproduced in paper form by such a recipient through an automated process.

An “electronic mail” means an electronic transmission directed to a unique electronic mail address (which electronic mail shall be deemed to include any files attached thereto and any information hyperlinked to a website if such electronic mail includes the contact information of an officer or agent of the Corporation who is available to assist with accessing such files and information).

An “electronic mail address” means a destination, commonly expressed as a string of characters, consisting of a unique user name or mailbox (commonly referred to as the “local part” of the address) and a reference to an internet domain (commonly referred to as the “domain part” of the address), whether or not displayed, to which electronic mail can be sent or delivered.

The term “person” means any individual, general partnership, limited partnership, limited liability company, corporation, trust, business trust, joint stock company, joint venture, unincorporated association, cooperative or association or any other legal entity or organization of whatever nature, and shall include any successor (by merger or otherwise) of such entity.

* * * * *

4D MOLECULAR THERAPEUTICS, INC.

CERTIFICATE OF AMENDMENT AND RESTATEMENT OF BYLAWS

=====

The undersigned hereby certifies that he or she is the duly elected, qualified, and acting Secretary of 4D Molecular Therapeutics, Inc., a Delaware corporation, and that the foregoing bylaws were amended and restated on _____, 2020 by the Corporation's board of directors.

IN WITNESS WHEREOF, the undersigned has hereunto set his or her hand this ___ day of _____, 2020.

Alan C. Mendelson
Secretary



NUMBER
4D

SHARES

INCORPORATED UNDER THE
LAWS OF THE STATE
OF DELAWARE

CUSIP 35104E 10 0

SEE REVERSE FOR CERTAIN
DEFINITIONS AND LEGENDS

This certifies that

is the record holder of

FULLY PAID AND NONASSESSABLE SHARES OF COMMON STOCK, \$0.0001 PAR VALUE PER SHARE, OF
4D MOLECULAR THERAPEUTICS, INC.

transferable on the books of the Corporation in person or by duly authorized attorney upon surrender of this Certificate properly endorsed. This Certificate is not valid until countersigned by the Transfer Agent and registered by the Registrar.

WITNESS the facsimile seal of the Corporation and the facsimile signatures of its duly authorized officers.

Dated:

CHIEF EXECUTIVE OFFICER



CHIEF FINANCIAL OFFICER

COUNTERSIGNED AND REGISTERED
AMERICAN STOCK TRANSFER & TRUST COMPANY, LLC
(BROOKLYN, NY)
TRANSFER AGENT
AND REGISTRAR
AUTHORIZED SIGNATURE

HERNANDEZ, D. V. 1/15/15

The Corporation shall furnish without charge to each stockholder who so requests a statement of the powers, designations, preferences and relative, participating, optional or other special rights of each class of stock of the Corporation or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights. Such requests shall be made to the Corporation's Secretary at the principal office of the Corporation.

KEEP THIS CERTIFICATE IN A SAFE PLACE. IF IT IS LOST, STOLEN, OR DESTROYED THE CORPORATION WILL REQUIRE A BOND INDEMNITY AS A CONDITION TO THE ISSUANCE OF A REPLACEMENT CERTIFICATE.

The following abbreviations, when used in the inscription on the face of this certificate, shall be construed as though they were written out in full according to applicable laws or regulations:

TEN COM - as tenants in common
TEN ENT - as tenants by the entireties
JT TEN - as joint tenants with right of survivorship and not as tenants in common
COM PROP - as community property

UNIF GIFT MIN ACT - _____ Custodian _____
(Cust) (Minor)
under Uniform Gifts to Minors Act _____
(State)
UNIF TRF MIN ACT - _____ Custodian (until age _____)
(Cust)
(Minor) under Uniform Transfers to Minors Act _____
(State)

Additional abbreviations may also be used though not in the above list.

FOR VALUE RECEIVED, _____ hereby sell(s), assign(s) and transfer(s) unto

PLEASE INSERT SOCIAL SECURITY OR OTHER IDENTIFYING NUMBER OF ASSIGNEE

(PLEASE PRINT OR TYPEWRITE NAME AND ADDRESS, INCLUDING ZIP CODE, OF ASSIGNEE)

_____ shares of the capital stock represented by within Certificate, and do hereby irrevocably constitute and appoint

_____ attorney-in-fact to transfer the said stock on the books of the within named Corporation with full power of the substitution in the premises.

Dated _____

Signature(s) Guaranteed:

X _____
X _____

NOTICE: THE SIGNATURE TO THIS ASSIGNMENT MUST CORRESPOND WITH THE NAME AS WRITTEN UPON THE FACE OF THE CERTIFICATE IN EVERY PARTICULAR, WITHOUT ALTERATION OR ENLARGEMENT OR ANY CHANGE WHATSOEVER.

By _____

THE SIGNATURE(S) SHOULD BE GUARANTEED BY AN ELIGIBLE GUARANTOR INSTITUTION, (BANKS, STOCKBROKERS, SAVINGS AND LOAN ASSOCIATIONS AND CREDIT UNIONS WITH MEMBERSHIP IN AN APPROVED SIGNATURE GUARANTEE MEDALLION PROGRAM), PURSUANT TO S.E.C. RULE 17A-15. GUARANTEES BY A NOTARY PUBLIC ARE NOT ACCEPTABLE. SIGNATURE GUARANTEES MUST NOT BE DATED.

4D MOLECULAR THERAPEUTICS, INC.

THIRD AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT

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Schedule 1 - Investors
Schedule 2 - Key Holders

THIRD AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT

This Third Amended and Restated Investors' Rights Agreement, dated as of April 29, 2020 (this "**Agreement**"), is entered into by and among 4D Molecular Therapeutics, Inc., a Delaware corporation (the "**Company**"), each holder of the Company's Preferred Stock, par value \$0.0001 per share (the "**Preferred Stock**"), listed on **Schedule 1** attached hereto (each, an "**Investor**" and, collectively, the "**Investors**"), and each Person (as defined below) listed on **Schedule 2** attached hereto (each, a "**Key Holder**" and collectively, the "**Key Holders**" and together with the Investors, the "**Stockholders**").

WHEREAS, certain of the Investors (the "**Prior Investors**") hold shares of Series A Preferred Stock, \$0.0001 par value per share, of the Company ("**Series A Preferred Stock**"), shares of Series A-1 Preferred Stock, \$0.0001 par value per share, of the Company ("**Series A-1 Preferred Stock**") and/or shares of Series B Preferred Stock, \$0.0001 par value per share, of the Company ("**Series B Preferred Stock**") (and/or shares of Common Stock (as defined below) issued upon conversion thereof), and possess registration rights, rights of first refusal and other rights pursuant to that certain Second Amended and Restated Investors' Rights Agreement, dated as of August 27, 2018 (the "**Prior Agreement**"), by and among the Company, the Key Holders and the Prior Investors;

WHEREAS, the Prior Investors are holders of at least a majority of the Registrable Securities then outstanding (as defined in the Prior Agreement) and the Key Holders hold a majority of the shares of capital stock of the Company held by all of the Key Holders (as defined in the Prior Agreement) who are providing services to the Company as directors, officers, employees or consultants, and the Prior Investors and the Key Holders desire to amend and restate the Prior Agreement in its entirety and accept the rights created pursuant to this Agreement in lieu of the rights granted to them under the Prior Agreement;

WHEREAS, the Company and certain of the Investors are parties to that certain Series C Preferred Stock Purchase Agreement, dated of even date herewith (the "**Series C Purchase Agreement**"), pursuant to which such Investors have agreed to purchase shares of Series C Preferred Stock, \$0.0001 par value per share, of the Company ("**Series C Preferred Stock**" and, together with the Series A Preferred Stock, Series A-1 Preferred Stock and Series B Preferred Stock, the "**Preferred Stock**") and under which certain of the Company's and such Investors' obligations are conditioned upon the execution and delivery of this Agreement by the parties hereto;

WHEREAS, in order to induce the Company to enter into the Series C Purchase Agreement and to induce certain of the Investors to invest funds in the Company pursuant to the Series C Purchase Agreement, the parties hereby agree that this Agreement shall govern the rights of the Investors to cause the Company to register shares of Common Stock (as defined below), to receive certain information from the Company and to participate in future equity offerings by the Company, and shall govern certain other matters, all as set forth in this Agreement; and

WHEREAS, the parties also desire to enter into this Agreement to set forth their agreements and understandings with respect to how shares of the Company's capital stock held by them will be voted on, or tendered in connection with, certain matters.

NOW, THEREFORE, the parties to this Agreement hereby agree as follows:

1. **Definitions.** In addition to the terms defined elsewhere in this Agreement, the following terms used herein shall be construed to have the meanings set forth or referenced below:

"Affiliate" means, with respect to any specified Person, any other Person who (i) directly or indirectly, controls, is controlled by, or is under common control with such specified Person, including any general partner, managing member, officer or director of such specified Person or any venture capital, private equity or similar investment fund now or hereafter existing which is controlled by one or more general partners or managing members of, or shares the same management company or investment advisor with, such specified Person or (ii) is an Immediate Family Member of or associated with such Person, including their respective trusts and other controlled entities.

"Board" means the Company's board of directors.

"Common Stock" means shares of Common Stock, par value \$0.0001 per share, of the Company.

"Company IPO" means the Company's first underwritten public offering of Common Stock under the Securities Act that includes securities to be sold on behalf of the Company to the public.

"Damages" means any loss, damage, claim or liability (joint or several) to which a Holder Indemnified Person (as defined in Section 2.8(a)) or a Company Indemnified Person (as defined in Section 2.8(b)) may become subject under the Securities Act, the Exchange Act or any state securities law in connection with a registration statement filed pursuant to Section 2, insofar as such loss, damage, claim or liability (or any action, claim or proceeding in respect thereof) arises out of or is based upon (i) any untrue statement or alleged untrue statement of a material fact contained in any such registration statement of the Company, including any preliminary prospectus or final prospectus contained therein or any amendments or supplements thereto, (ii) an omission or alleged omission to state therein a material fact required to be stated therein, or necessary to make the statements therein not misleading, or (iii) any violation or alleged violation by the indemnifying party (or any of its agents or Affiliates) of the Securities Act, the Exchange Act or any state securities law.

"Deemed Liquidation Event" has the meaning given to that term in the Restated Charter.

"Exchange Act" means the Securities Exchange Act of 1934, as amended.

"Excluded Registration" means (i) a registration relating to the sale of securities to employees of the Company or any of its subsidiaries pursuant to a stock option, stock purchase or similar plan, (ii) a registration relating to a Rule 145 transaction, (iii) a registration on any form that does not include substantially the same information as would be required to be included in a registration statement covering the sale of the Registrable Securities, or (iv) a registration in which the only Common Stock being registered is Common Stock issuable upon conversion of debt securities that are also being registered.

“Form S-1” means such form registration statement under the Securities Act as in effect on the date of this Agreement or any successor form registration statement under the Securities Act subsequently adopted by the SEC.

“Form S-3” means such form registration statement under the Securities Act as in effect on the date of this Agreement or any form registration statement under the Securities Act subsequently adopted by the SEC that permits incorporation of substantial information by reference to other documents filed by the Company with the SEC.

“Holder” means any holder of Registrable Securities who is a party to this Agreement or any assignee of record of such Registrable Securities to whom registration rights set forth in Section 2 have been duly assigned in accordance with Section 2.13.

“Immediate Family Member” means a spouse (or former spouse) or domestic partner, child or stepchild, grandchild, parent, stepparent, sibling, father-in-law, mother-in-law, son-in-law, daughter-or-law, brother-in-law, sister-in-law, grandparent, niece or nephew, including adoptive relationships, of a natural person referred to herein. A person shall be deemed to be a “domestic partner” of another person if the two persons (i) reside in the same residence and plan to do so indefinitely, (ii) have resided together for at least one year, (iii) are each at least 18 years of age and mentally competent to consent to contract, (iv) are not blood relatives closer than would prohibit legal marriage in the state in which they reside, (v) are financially interdependent, as demonstrated to the Company’s reasonable satisfaction, and (vi) have each been the sole spousal equivalent of the other for the year prior to the determination of “domestic partner” status and plan to remain so indefinitely; provided, however, that a person shall not be deemed to be a “domestic partner” if he or she is married to another person or has any other spousal equivalent.

“Initiating Holders” means, collectively, Holders who properly initiate a registration request under this Agreement.

“Major Investor” means any Investor that, individually or together with such Investor’s Affiliates, holds at least 450,000 shares of Registrable Securities.

“New Securities” means, collectively, (i) equity securities of the Company, whether or not currently authorized, (ii) rights, options or warrants to purchase equity securities of the Company, and (iii) securities of any type whatsoever that are, or may become, convertible or exchangeable into or exercisable for equity securities of the Company.

“Other Shares” means shares of Common Stock, other than Registrable Securities, with respect to which registration rights have been granted by the Company.

“Person” means an individual, a partnership, a corporation (including a business trust), a joint stock company, a limited liability company, an unincorporated association, a joint venture or other entity or a governmental authority.

“**Pfizer**” means (i) Pfizer Manufacturing LLC, a Delaware limited liability company, and Pfizer Production LLC, a Delaware limited liability company, acting for and on behalf of C.P. Pharmaceuticals International C.V., a Netherlands limited partnership (commanditaire vennootschap), and (ii) Pfizer Inc.

“**Preferred Directors**” means the Series A-1 Director (as defined below), so long as Pfizer is entitled to elect a Series A-1 Director, the Series B Director (as defined below), so long as the holders of Series B Preferred Stock are entitled to elect a Series B Director and the Series C Director (as defined below), so long as the holders of Series C Preferred Stock are entitled to elect a Series C Director.

“**Registrable Securities**” means (i) the Common Stock issued or issuable upon conversion of the Preferred Stock and (ii) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right or other security that is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, the shares referenced in clause (i) above; excluding, in all cases, however, (x) any Registrable Securities Transferred by a Person in a transaction in which the applicable rights under this Agreement are not assigned in accordance with the terms and provisions of this Agreement, (y) any Registrable Securities that have been previously registered, and (z) any Registrable Securities that have been sold to the public either pursuant to a registration statement or Rule 144, and excluding, for purposes of Section 2, any shares for which registration rights have terminated pursuant to Section 2.14.

“**Registrable Securities then outstanding**” means the number of shares determined by adding (i) the number of shares of outstanding Common Stock which are Registrable Securities that are then issued and outstanding and (ii) the number of shares of Common Stock issuable (directly or indirectly) pursuant to then exercisable and/or then convertible securities that are Registrable Securities.

“**Restated Charter**” means the Company’s Fourth Amended and Restated Certificate of Incorporation, as amended from time to time.

“**Restricted Securities**” means (i) the Preferred Stock, (ii) the Registrable Securities, and (iii) any other securities issued in respect of the securities referenced in clauses (i) and (ii) upon any stock combination, stock split, stock dividend, recapitalization or other similar transaction.

“**ROFR and Co-Sale Agreement**” means that certain Third Amended and Restated Right of First Refusal and Co-Sale Agreement, dated of even date herewith, by and among the Company and the other parties specified therein.

“**Rule 144**” means Rule 144 promulgated by the SEC under the Securities Act, as amended from time to time, or any similar rule that may be promulgated by the SEC.

“**Rule 145**” means Rule 145 promulgated by the SEC under the Securities Act, as amended from time to time, or any similar rule that may be promulgated by the SEC.

“**SEC**” means the U.S. Securities and Exchange Commission.

“**Securities Act**” means the Securities Act of 1933, as amended.

“**Selling Expenses**” means, collectively, (i) all underwriting discounts, selling commissions and stock transfer taxes applicable to the sale of Registrable Securities and (ii) the fees and disbursements of legal counsel for any Holder, except for the fees and disbursements of the Selling Holder Counsel (as defined in Section 2.6) borne and paid by the Company as provided in Section 2.6.

“**Transfer**” means any sale, transfer, assignment, pledge, encumbrance or other disposition; provided, that any customary arrangement in connection with the deposit of Registrable Securities in a non-margin custodial account shall not be deemed a sale, transfer or pledge for purposes of this Agreement so long as such Registrable Securities are in certificated form (it being understood that the Company may require the exchange of any such certificated securities for book-entry shares upon the Company IPO).

“**Viking**” means Viking Global Opportunities Illiquid Investments Sub-Master LP and its Affiliates.

“**Voting Shares**” means and includes any securities of the Company the holders of which are entitled to vote for members of the Board, including all shares of Common Stock and Preferred Stock, by whatever name called, now owned or subsequently acquired by a Stockholder, however acquired, whether through stock splits, stock dividends, reclassifications, recapitalizations, similar events or otherwise.

2. Registration Rights. The Company covenants and agrees as follows:

2.1 Demand Registration.

(a) Form S-1 Demand. If, at any time after 180 days after the effective date of the registration statement for the Company IPO (or the subsequent date on which all lock-up periods applicable to the Company IPO have terminated), the Company receives a written request from Holders of at least 50% of the Registrable Securities then outstanding that the Company file a Form S-1 with respect to at least 50% of the Registrable Securities then outstanding (or a lesser percent if the anticipated aggregate offering price, net of Selling Expenses, would exceed \$50,000,000), then the Company shall (A) within 20 days after the Company’s receipt of such request, give written notice thereof (the “**Form S-1 Demand Notice**”) to all Holders other than the Initiating Holders and (B) as soon as practicable, and in any event within 60 days after the Company’s receipt of such request, file a Form S-1 under the Securities Act covering all Registrable Securities that the Initiating Holders requested to be registered and any additional Registrable Securities requested to be included in such registration by any other Holders, as specified in a written notice given by each such Holder to the Company by no later than the 20th day after the date on which the Form S-1 Demand Notice is, pursuant to Section 8.5, deemed to have been delivered to such Holder, and, in each case, subject to the limitations of this Section 2. Any registration statement filed pursuant to this Section 2.1(a) may, subject to the provisions of Section 2.3, include Company Shares (as defined in Section 2.3(a)) or Other Shares.

(b) Form S-3 Demand. If, at any time when the Company is eligible to use a Form S-3, the Company receives a written request from Holders of at least 30% of the Registrable Securities then outstanding that the Company file a Form S-3 with respect to Registrable Securities then outstanding of such Holders having an anticipated aggregate offering price, net of Selling Expenses, of at least \$5,000,000, then the Company shall (i) within 20 days after the Company's receipt of such request, give a written notice thereof (the "**Form S-3 Demand Notice**") to all Holders other than the Initiating Holders and (ii) as soon as practicable, and in any event within 45 days after the Company's receipt of such request, file a Form S-3 under the Securities Act covering all Registrable Securities that the Initiating Holders requested to be registered and any additional Registrable Securities requested to be included in such registration by any other Holders, as specified in a written notice given by each such Holder to the Company by no later than the tenth day after the date on which the Form S-3 Demand Notice is, pursuant to Section 8.5, deemed to have been delivered to such Holder, and, in each case, subject to the limitations of this Section 2. Any registration statement filed pursuant to this Section 2.1(b) may, subject to the provisions of Section 2.3, include Company Shares (as defined in Section 2.3(a)) or Other Shares.

(c) Deferral. Notwithstanding the foregoing obligations in Section 2.1(a) and Section 2.1(b), if the Company furnishes to the Holders requesting a registration pursuant to this Section 2.1 a certificate signed by the Company's Chief Executive Officer or President stating that, in the good faith judgment of the Board, it would be materially detrimental to the Company and its stockholders for such registration statement to be filed and it is therefore necessary to defer the filing of such registration statement, then the Company shall have the right to defer taking action with respect to such filing, and any time periods with respect to filing or effectiveness thereof shall be tolled correspondingly, for a period of not more than 120 days after delivery to the Company by the Initiating Holders of such registration request; provided, however, that the Company may not invoke this right more than once in any 12-month period; provided, further, that the Company shall not register any securities for its own account or that of any other stockholder during such 120-day period other than pursuant to an Excluded Registration.

(d) Limitations. The Company shall not be obligated to effect, or to take any action to effect, any registration pursuant to Section 2.1(a): (i) during the period that is 60 days before the Company's good faith estimate of the date of filing of, and ending on a date that is 180 days after the effective date of, a Company-initiated registration, provided that the Company is actively employing, in good faith, commercially reasonable efforts to cause such registration statement to become effective; (ii) if the Company has already effected two (2) registrations pursuant to Section 2.1(a); or (iii) if the Initiating Holders propose to dispose of shares of Registrable Securities that may be immediately registered on Form S-3 pursuant to a request made pursuant to Section 2.1(b). The Company shall not be obligated to effect, or to take any action to effect, any registration pursuant to Section 2.1(b): (i) during the period that is 30 days before the Company's good faith estimate of the date of filing of, and ending on a date that is 90 days after the effective date of, a Company-initiated registration, provided that the Company is actively employing, in good faith, commercially reasonable efforts to cause such registration statement to become effective; or (ii) if the Company has already effected two (2) registrations pursuant to Section 2.1(b) within the 12-month period immediately preceding the date of such request. A registration shall not be counted as "effected" for purposes of this Section 2.1(d) until such time as the applicable registration statement has been declared effective by the SEC; provided, however, that if (i) Holders of a majority of the Registrable Securities to be registered withdraw the request for such registration or a sufficient number of Holders withdraw from such registration so that the minimum offering conditions set forth in Section 2.1(a) or Section 2.1(b), as applicable, are no longer satisfied and (ii) the Holders of a majority of the Registrable Securities agree to

forfeit their right to one registration pursuant to Section 2.1(a) or Section 2.1(b), as the case may be, as described in Section 2.6, with the Company paying the Withdrawn Registration Expenses (as defined in Section 2.6), then such withdrawn registration statement shall be counted as “effected” for purposes of this Section 2.1(d).

2.2 Company Registration. If the Company proposes to register (including, for this purpose, a registration effected by the Company for stockholders other than the Holders) any of its Common Stock under the Securities Act in connection with the public offering of such securities solely for cash (other than in an Excluded Registration), then the Company shall, at such time, promptly give each Holder written notice of such registration (the “**Company Notice**”). Upon the written request of each Holder given to the Company by no later than the 20th day after the date on which the Company Notice is, pursuant to Section 8.5, deemed to have been delivered to such Holder, the Company shall, subject to the provisions of Section 2.3, cause to be registered all of the Registrable Securities that each such Holder has so requested to be included in such registration. The Company shall have the right to terminate or withdraw any registration initiated by it under this Section 2.2 before the effective date of such registration, whether or not any Holder has elected to include Registrable Securities in such registration. The expenses of such withdrawn registration (other than Selling Expenses) shall be borne by the Company in accordance with Section 2.6.

2.3 Underwriting Requirements.

(a) If, pursuant to Section 2.1, the Initiating Holders intend to distribute the Registrable Securities covered by their request by means of an underwriting, they shall so advise the Company as part of their request made pursuant to Section 2.1, and the Company shall include such information in the Form S-1 Demand Notice. The underwriter(s) will be selected by the Company and shall be reasonably acceptable to a majority in interest of the Initiating Holders. If, within 20 days after the Company’s receipt of a written registration request pursuant to Section 2.1, the Company delivers to the Initiating Holders a written request to include in such registration (x) securities being sold for the Company’s own account (“**Company Shares**”) or (y) Other Shares, then the Initiating Holders shall, on behalf of all Holders, offer to include the Company Shares and such Other Shares in the underwriting. All Holders proposing to distribute their securities through such underwriting shall, together with the Company as provided in Section 2.4(e) and the holders of any Other Shares that are to be included in such underwriting and registration (such holders, the “**Other Holders**”), enter into an underwriting agreement in customary form with the underwriter(s) selected for such underwriting. Notwithstanding any other provision of this Section 2, if the managing underwriter(s) advise(s) the Initiating Holders, in writing, that marketing factors require a limitation on the number of shares to be underwritten, then the Initiating Holders shall so notify the Company, all Holders of Registrable Securities that otherwise would be underwritten and registered and all Other Holders, in writing, and the number of Registrable Securities, Company Shares and Other Shares that may be included in such underwriting and registration shall be allocated as follows: (i) first, among all Holders that requested inclusion of any Registrable Securities in such registration statement, including the Initiating Holders, in proportion (as nearly as practicable) to the number of Registrable Securities held by each selling Holder (or in such other proportion as shall mutually be agreed to, in writing, by all such selling Holders), provided, however, that the number of Registrable Securities held by the Holders to be included in such underwriting shall

not be reduced unless all other securities are first entirely excluded from the underwriting; (ii) second, to the Other Holders; and (iii) third, to the Company. To facilitate the allocation of shares in accordance with the foregoing provisions of this Section 2.3(a), the Company or the underwriter(s) may round the number of shares allocated to any Holder or Other Holder, as the case may be, to the nearest 100 shares.

(b) In connection with any offering involving an underwriting of shares of the Company's capital stock pursuant to Section 2.2 (each, a "**Company Offering**"), the Company will not be required to include any Registrable Securities in such Company Offering unless the Holders of the Registrable Securities to be included in such Company Offering accept the terms of the underwriting as agreed upon between the Company and the underwriter(s) selected by the Company (and enter into an underwriting agreement in customary form with the underwriter(s) selected for such Company Offering), and then only in such quantity, as determined in the sole discretion of the underwriter(s) and the Company, as will not jeopardize the success of such Company Offering. If the total number of securities, including Registrable Securities, requested by stockholders of the Company to be included in a Company Offering exceeds the number of securities to be sold (other than by the Company) that the underwriter(s) and the Company determine is compatible with the success of such Company Offering, then the Company will be required to include in such Company Offering only that number of such securities, including Registrable Securities, which the underwriter(s) and the Company in their sole discretion determine will not jeopardize the success of such Company Offering. If the underwriter(s) and the Company determine that less than all of the Registrable Securities requested to be registered can be included in a Company Offering, then the Registrable Securities that are included in such Company Offering shall be allocated among the selling Holders in proportion (as nearly as practicable) to the number of Registrable Securities held by each selling Holder (or in such other proportion as shall mutually be agreed to, in writing, by all such selling Holders). To facilitate the allocation of shares in accordance with the foregoing provisions of this Section 2.3(b), the Company or the underwriter(s) may round the number of shares allocated to any Holder or Other Holder, as the case may be, to the nearest 100 shares. Notwithstanding the foregoing, in no event shall the number of Registrable Securities to be included in a Company Offering (i) be reduced unless all other securities (other than securities to be sold by the Company) are first entirely excluded from such Company Offering or (ii) be reduced below 30% of the total number of securities included in such Company Offering, unless such Company Offering is the Company IPO, in which case the selling Holders may be excluded further if the underwriter(s) and the Company make the determination described above and no other stockholder's securities are included in such Company Offering. For purposes of the provisions in this Section 2.3(b) concerning apportionment, for any selling Holder that is a partnership, limited liability company or corporation, the partners, members, retired partners, retired members, stockholders and Affiliates of such Holder, or the estates and Immediate Family Members of any such partners, members, retired partners and retired members and any trusts for the benefit of any of the foregoing Persons, shall be deemed to be a single "selling Holder," and any pro rata reduction with respect to such "selling Holder" shall be based upon the aggregate number of Registrable Securities owned by all Persons included in such "selling Holder," as defined in this sentence.

(c) For purposes of Section 2.1, a registration shall not be counted as “effected” if, as a result of an exercise of the underwriters’ and the Company’s cutback in Section 2.3(a), fewer than fifty percent (50%) of the total number of Registrable Securities that Holders have requested to be included in such registration statement are actually included.

2.4 Obligations of the Company. Whenever required under this Section 2 to effect the registration of any Registrable Securities, the Company shall use its commercially reasonable efforts to:

(a) prepare and file with the SEC a registration statement with respect to such Registrable Securities and cause such registration statement to become effective and, upon the request of the Holders of a majority of the Registrable Securities registered thereunder, keep such registration statement effective for a period of up to 90 days or, if shorter, until the distribution contemplated therein has been completed; provided, however, that such 90-day period shall be extended for a period of time equal to the period that the Holders refrain, at the request of an underwriter of Common Stock (or other securities) of the Company, from selling any securities included in such registration;

(b) prepare and file with the SEC such amendments and supplements to the registration statement with respect to such Registrable Securities, or prospectus forming a part thereto, as may be necessary to comply with the Securities Act in order to enable the disposition of all Registrable Securities covered by such registration statement for the period set forth in Section 2.4(a);

(c) furnish to the selling Holders such number of copies of a prospectus (including a preliminary prospectus) as required by the Securities Act and such other documents incident thereto as such Holders may reasonably request in order to facilitate the disposition of their Registrable Securities included in such registration;

(d) register and qualify the Registrable Securities covered by the registration statement under such other securities or blue sky laws of such jurisdictions as shall be reasonably requested by the selling Holders; provided, however, that the Company shall not be required to qualify to do business, or to file a general consent to service of process, in any such states or jurisdictions;

(e) in the event of any underwritten public offering, enter into an underwriting agreement, in usual and customary form, with the underwriter(s) of such offering, provided that each Holder participating in such underwriting also enters into such agreement;

(f) cause all Registrable Securities covered by the registration statement to be listed on a national securities exchange or trading system and each securities exchange and trading system (if any) on which similar securities issued by the Company are then listed;

(g) provide a transfer agent and registrar for all Registrable Securities registered pursuant to this Agreement and provide a CUSIP number for all such Registrable Securities, in each case not later than the effective date of such registration;

(h) promptly make all financial and other records, pertinent corporate documents and properties of the Company available for inspection by the selling Holders, any managing underwriter(s) participating in any disposition pursuant to the registration statement with respect to such Registrable Securities and any attorney, accountant or other agent retained by any such selling Holders or underwriter(s) and cause the Company's directors, officers, employees and independent accountants to supply all information reasonably requested by any such selling Holder, underwriter, attorney, accountant or agent, in each case, as necessary or advisable to verify the accuracy of the information in such registration statement and to conduct appropriate due diligence in connection therewith;

(i) notify each selling Holder, promptly after the Company receives notice thereof, of the time when the registration statement with respect to such Registrable Securities has been declared effective or a supplement to any prospectus forming a part thereto has been filed; and

(j) notify each selling Holder, after a registration statement with respect to such Registrable Securities becomes effective, of any request by the SEC that the Company amend or supplement such registration statement or prospectus forming a part thereto.

In addition, the Company shall ensure that, at all times after any registration statement covering a public offering of the Company's securities under the Securities Act shall have become effective, its insider trading policy shall provide that the Company's directors may implement a trading program under Rule 10b5-1 of the Exchange Act.

2.5 Furnish Information. It shall be a condition precedent to the Company's obligation to take any action pursuant to this Section 2 with respect to the Registrable Securities of any selling Holder that such Holder shall have furnished to the Company such information regarding himself/herself/itself, the Registrable Securities held by him/her/it, and the intended method of disposition of such Registrable Securities as is reasonably required in connection with any registration, qualification or compliance referred to in this Section 2.

2.6 Expenses of Registration. All expenses (other than Selling Expenses) incurred in connection with registrations pursuant to Section 2.1(a) and Section 2.2 and the first registration pursuant to Section 2.1(b), including all registration, filing and qualification fees, printers' and accounting fees, fees and disbursements of legal counsel for the Company, and the reasonable fees and disbursements (not to exceed \$25,000) of one legal counsel for the selling Holders (the "**Selling Holder Counsel**"), shall be borne and paid by the Company; provided, however, that the Company shall not be required to pay for any expenses of any registration proceeding begun pursuant to Section 2.1 if such registration request is subsequently withdrawn at the request of the Holders of a majority of the Registrable Securities to be registered or because a sufficient number of Holders have withdrawn from such registration so that the minimum offering conditions set forth in Section 2.1(a) or Section 2.1(b), as applicable, are no longer satisfied (such expenses, "**Withdrawn Registration Expenses**") (in which case, all participating Holders shall bear such Withdrawn Registration Expenses pro rata based upon the number of Registrable Securities that were to be included by each such Holder in such withdrawn registration), unless the Holders of a majority of the Registrable Securities agree to forfeit their right to one registration pursuant to Section 2.1(a) or Section 2.1(b), as the case may be (in which case, such right shall be forfeited by all Holders and the Company shall pay for such Withdrawn Registration Expenses); provided, further, that, if, at the time of such withdrawal, the Holders requesting withdrawal (x) shall have learned of a material adverse change in the condition, business or

prospects of the Company from that known to the Holders at the time of their registration request and (y) have withdrawn their request with reasonable promptness after learning of such material adverse change, then the Holders shall not be required to pay for any of such Withdrawn Registration Expenses and shall not forfeit their right to one registration pursuant to Section 2.1(a) or Section 2.1(b), as the case may be. Notwithstanding anything to the contrary contained herein, (i) all Selling Expenses and fees and disbursements of the Selling Holder Counsel in excess of \$25,000 shall be borne and paid by the Holders pro rata based upon the number of Registrable Securities registered on their behalf (or, in the case of a withdrawn registration, the number of Registrable Securities that were to be included on their behalf) and (ii) all expenses incurred in connection with any registration pursuant to Section 2.1(b) after the first such registration shall be borne and paid by the Holders who participate in such registration pro rata based upon the number of Registrable Securities registered on their behalf (or, in the case of a withdrawn registration, the number of Registrable Securities that were to be included on their behalf).

2.7 Delay of Registration. No Holder shall have any right to take any action to restrain, enjoin or otherwise delay any registration pursuant to this Agreement as the result of any controversy that might arise with respect to the interpretation or implementation of this Section 2.

2.8 Indemnification.

(a) By the Company. If any Registrable Securities are included in a registration statement under this Section 2, then, to the extent permitted by law, the Company will indemnify and hold harmless each selling Holder, the partners, members, directors, officers and stockholders of each such Holder, legal counsel and accountants for each such Holder, any underwriter (as defined in the Securities Act) for each such Holder and each Person, if any, who controls such Holder or underwriter within the meaning of the Securities Act or the Exchange Act (each, a “**Holder Indemnified Person**”) against any Damages, and the Company will pay to each Holder Indemnified Person any legal or other expenses reasonably incurred by him/her/it, within three months after a request for reimbursement has been received by the Company, in connection with investigating or defending any action, claim or proceeding from which Damages may result; provided, however, that the indemnity agreement contained in this Section 2.8(a) shall not apply to amounts paid in settlement of any such action, claim or proceeding if such settlement is effected without the Company’s prior written consent, which consent shall not be unreasonably withheld, nor shall the Company be liable for any Damages to the extent that they arise out of or are based upon statements, actions, omissions or violations made in reliance upon, and in conformity with, written information furnished by or on behalf of any such Holder Indemnified Person expressly for use in connection with such registration.

(b) By Selling Holders. If any Registrable Securities are included in a registration statement under this Section 2, then, to the extent permitted by law, each selling Holder, severally and not jointly, will indemnify and hold harmless the Company, the directors, officers and partners of the Company, legal counsel and accountants for the Company, any underwriter (as defined in the Securities Act) and each Person, if any, who controls the Company or such underwriter within the meaning of the Securities Act or the Exchange Act (each, a “**Company Indemnified Person**”) against any Damages, and such selling Holder will pay to each Company Indemnified Person any legal or other expenses reasonably incurred by him/her/it, within three months after a request for reimbursement has been received by such selling Holder,

in connection with investigating or defending any action, claim or proceeding from which Damages may result, in each case only to the extent that such Damages arise out of or are based upon statements, actions, omissions or violations made in reliance upon, and in conformity with, written information furnished by or on behalf of such selling Holder expressly for use in connection with such registration; provided, however, that the indemnity agreement contained in this Section 2.8(b) shall not apply to amounts paid in settlement of any such action, claim or proceeding if such settlement is effected without such selling Holder's prior written consent, which consent shall not be unreasonably withheld; provided, further, that in no event shall the aggregate amounts payable by any selling Holder by way of indemnity under this Section 2.8(b) or contribution under Section 2.8(d) exceed the proceeds from the offering received by such Holder (net of any Selling Expenses paid by such Holder), except in the case of fraud or willful misconduct by such Holder.

(c) Notice. Promptly after (i) receipt by a Holder Indemnified Person or a Company Indemnified Person (each, an "**Indemnified Party**") of notice of the commencement of any action, claim or proceeding (including any governmental action, claim or proceeding) for which a party may be entitled to indemnification hereunder or (ii) an Indemnified Party has actual knowledge of any claim as to which indemnity may be sought hereunder, such Indemnified Party shall, if a claim in respect thereof is to be made against any indemnifying party under this Section 2.8 (each, an "**Indemnifying Party**"), give the Indemnifying Party written notice thereof. The Indemnifying Party shall have the right to (x) participate in such action, claim or proceeding and, to the extent the Indemnifying Party so desires, participate jointly with any other Indemnifying Party to which written notice has been given and (y) assume the defense thereof with legal counsel approved by the Indemnified Party (whose approval shall not be unreasonably withheld); provided, however, that the Indemnified Party shall have the right to retain one separate counsel, with the fees and expense to be paid by the Indemnifying Party, if representation of such Indemnified Party by the counsel retained by the Indemnifying Party would be inappropriate due to actual or potential differing interests between such Indemnified Party and any other party represented by such counsel in such action. The failure to give timely written notice to the Indemnifying Party as provided in this Section 2.8(c) (1) shall relieve such Indemnifying Party of any liability to the Indemnified Party under this Section 2.8, but only to the extent that such failure materially prejudices the Indemnifying Party's ability to defend such action, claim or proceeding and (2) shall not relieve such Indemnifying Party of any liability that it may have to the Indemnified Party otherwise than under this Section 2.8. Each Indemnified Party shall furnish such information regarding such Indemnified Party or the claim in question as the Indemnifying Party may reasonably request in writing and as shall be reasonably required in connection with the defense of such action, claim or proceeding.

(d) Contribution. To provide for just and equitable contribution to joint liability under the Securities Act in any case in which either (i) any party otherwise entitled to indemnification hereunder makes a claim for indemnification pursuant to this Section 2.8 but it is judicially determined (by the entry of a final judgment or decree by a court of competent jurisdiction and the expiration of time to appeal or the denial of the last right of appeal) that such indemnification may not be enforced in such case, notwithstanding the fact that this Section 2.8 provides for indemnification in such case, or (ii) contribution under the Securities Act may be required on the part of any party hereto for which indemnification is provided under this Section 2.8, then, and in each such case, such parties shall contribute to the aggregate losses, damages,

claims, liabilities or expenses to which they may be subject (after contribution from others) in such proportion as is appropriate to reflect the relative fault of each of the Indemnifying Party and the Indemnified Party in connection with the statements, actions, omissions or violations that resulted in such loss, damage, claim, liability or expense, as well as to reflect any other relevant equitable considerations. The relative fault of the Indemnifying Party and of the Indemnified Party shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact, or the omission or alleged omission of a material fact, relates to information supplied by the Indemnifying Party or by the Indemnified Party and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission; provided, however, that, (x) no Holder will be required to contribute any amount in excess of the public offering price of all such Registrable Securities offered and sold by such Holder pursuant to such registration statement, and (y) in any such case, no Person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) will be entitled to contribution from any Person who was not guilty of such fraudulent misrepresentation; and provided further that in no event shall a Holder's liability pursuant to this Section 2.8(d), when combined with the amounts paid or payable by such Holder pursuant to Section 2.8(b), exceed the proceeds from the offering received by such Holder, except in the case of willful misconduct or fraud by such Holder.

(e) Conflict with Underwriting Agreement. Notwithstanding the foregoing provisions of this Section 2.8, to the extent that the provisions on indemnification and contribution contained in the underwriting agreement entered into in connection with an underwritten public offering under this Section 2 are in conflict with the foregoing provisions of this Section 2.8, the provisions in the underwriting agreement shall control.

(f) Survival. Unless otherwise superseded by an underwriting agreement entered into in connection with an underwritten public offering under this Section 2, the obligations of the Company and the Holders pursuant to this Section 2.8 shall survive the completion of any offering of Registrable Securities in a registration under this Section 2 and otherwise shall survive the termination of this Agreement.

2.9 Reports Under Exchange Act. With a view to making available to the Holders the benefits of Rule 144 and any other rule or regulation of the SEC that may at any time permit a Holder to sell Registrable Securities to the public pursuant to a registration on Form S-3 or without registration, the Company shall use its commercially reasonable efforts to:

(a) at any time from and after 90 days following the effective date of the registration statement filed by the Company for the Company IPO, make and keep available adequate current public information (as those terms are understood and defined in Rule 144) with respect to the Company;

(b) at any time after the Company has become subject to such reporting requirements, file with the SEC in a timely manner all reports and other documents required of the Company under the Securities Act and the Exchange Act; and

(c) so long as a Holder owns any Registrable Securities, furnish to such Holder upon his/her/its written request (i) to the extent accurate, a written statement by the Company that (A) it has complied with the reporting requirements of Rule 144 (at any time from and after 90 days following the effective date of the registration statement filed by the Company for the Company IPO), the Securities Act and the Exchange Act (at any time after the Company has become subject to such reporting requirements) or (B) it qualifies as a registrant whose securities may be resold pursuant to Form S-3 (at any time after the Company so qualifies to use such form) and (ii) such other information as may be reasonably requested by such Holder in availing himself/herself/itself of any rule or regulation of the SEC that permits the selling of such securities of the Company to the public pursuant to a registration on Form S-3 (at any time after the Company so qualifies to use such form) or without registration (at any time after the Company has become subject to the reporting requirements under the Exchange Act).

2.10 Limitations on Subsequent Registration Rights. From and after the date of this Agreement, the Company shall not, without the prior written consent of the holders of at least a majority of the Registrable Securities, enter into any agreement with any holder or prospective holder of any securities of the Company giving such holder or prospective holder any registration rights the terms of which are pari passu with or senior to the registration rights granted to the Holders hereunder; provided that this limitation shall not apply to Registrable Securities acquired by any additional Investor that becomes a party to this Agreement in accordance with Subsection 8.13(a).

2.11 Lock-Up Period. Each Holder hereby agrees that such Holder will not, during the period commencing on the date of the final prospectus relating to the Company IPO and ending on the date specified by the Company and the managing underwriter(s) (such period not to exceed 180 days), (a) sell, dispose of, make any short sale of, offer, hypothecate, pledge, contract to sell, grant or sell any option or contract to purchase, purchase any option or contract to sell, grant any right or warrant to purchase, lend or otherwise transfer or encumber, directly or indirectly, any shares of Common Stock or other securities convertible into or exercisable or exchangeable (directly or indirectly) for shares of Common Stock held immediately prior to the effectiveness of the Registration Statement for such Offering (such shares and other securities, the "**Lock-Up Shares**") or (b) enter into any swap, hedging or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of any Lock-Up Shares, whether any such transaction described in clause (a) or (b) above is to be settled by delivery of Common Stock or other securities, in cash or otherwise. The foregoing provisions of this Section 2.11 (1) shall not apply to the sale of any Lock-Up Shares to an underwriter pursuant to an underwriting agreement or that are permitted to be sold or otherwise transferred under the terms of any then-effective lock-up agreement between the Holder and the underwriter(s) and (2) shall be applicable to the Holders only if all directors and officers of the Company are subject to similar restrictions and the Company uses commercially reasonable effort to obtain a similar agreement from all stockholders individually owning more than one percent (1%) of the Company's outstanding Common Stock (after giving effect to conversion into Common Stock of all outstanding shares of Preferred Stock). The underwriters for any registered offering described in this Section 2.11 are intended third party beneficiaries of this Section 2.11 and shall have the right, power and authority to enforce the provisions of this Section 2.11 as though they were parties hereto. Each Holder further agrees to execute such agreements as may be reasonably requested by the underwriter(s) in connection with any registered offering described in this Section 2.11 and that are consistent with this Section 2.11 or necessary to give further effect thereto; provided, however, that if a Holder has already entered into a lock-up agreement

with the underwriter(s) in connection with a proposed IPO, such Holder agrees to execute an agreement containing terms substantially similar to those set forth in the underwriter lock-up agreement previously executed. Any discretionary waiver or termination of the restrictions of any or all of such agreements by the Company or the underwriter(s) shall apply pro rata to all Holders subject to such agreements based on the number of shares subject to such agreements.

2.12 Restrictions on Transfer.

(a) The Restricted Securities, and any beneficial interest therein, shall not be Transferred, and the Company will not recognize, and will issue stop-transfer instructions to its transfer agent with respect to, any such Transfer, except upon the conditions specified in this Agreement, which conditions are intended to ensure compliance with the provisions of the Securities Act. Each Holder shall cause any proposed purchaser, pledgee or transferee of any Restricted Securities held by such Holder to agree, in a written instrument delivered to the Company, to take and hold such securities subject to the provisions, and upon the conditions, specified in this Agreement (including the obligations set forth in Section 2.11).

(b) Each certificate evidencing any Restricted Securities shall (unless otherwise permitted by the provisions of Section 2.12(c)) bear the following legends (or substantially equivalent legends) in addition to any legends required under applicable securities laws:

THE SECURITIES REPRESENTED BY THIS CERTIFICATE HAVE BEEN ACQUIRED FOR INVESTMENT AND NOT WITH A VIEW TO, OR IN CONNECTION WITH, THE SALE OR DISTRIBUTION THEREOF AND HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "ACT"), OR ANY STATE SECURITIES LAWS. THEY MAY NOT BE OFFERED, SOLD OR OTHERWISE TRANSFERRED, PLEDGED OR HYPOTHECATED EXCEPT AS PERMITTED UNDER THE ACT AND APPLICABLE STATE SECURITIES LAWS PURSUANT TO AN EFFECTIVE REGISTRATION STATEMENT OR AN EXEMPTION THEREFROM. THE ISSUER OF THESE SECURITIES MAY REQUIRE AN OPINION OF COUNSEL SATISFACTORY TO THE ISSUER THAT SUCH OFFER, SALE, TRANSFER, PLEDGE OR HYPOTHECATION OTHERWISE COMPLIES WITH THE ACT AND ANY APPLICABLE STATE SECURITIES LAWS.

THE SECURITIES REPRESENTED BY THIS CERTIFICATE ARE SUBJECT TO THE TERMS OF AGREEMENTS BETWEEN THE ISSUER AND THE ORIGINAL HOLDER OF SUCH SECURITIES (COPIES OF WHICH ARE ON FILE WITH THE SECRETARY OF THE ISSUER) AND BY ACCEPTING ANY INTEREST IN SUCH SECURITIES THE PERSON ACCEPTING SUCH INTEREST SHALL BE DEEMED TO AGREE TO, AND SHALL BECOME BOUND BY, ALL OF THE PROVISIONS OF THOSE AGREEMENTS, INCLUDING CERTAIN RESTRICTIONS ON TRANSFER AND OWNERSHIP SET FORTH THEREIN.

The parties hereby agree that the failure to cause the certificates, if any, evidencing Restricted Securities to bear the legends required by this Section 2.12(b) shall not affect the validity or enforcement of this Agreement. In order to enforce the provisions hereof, the Company may issue appropriate stop-transfer instructions to its transfer agent, if any, and if the Company transfers its own securities, it may make appropriate notations to the same effect in its own records.

(c) Each holder of Restricted Securities, by acceptance thereof, agrees to comply in all respects with the provisions of this Section 2. Before any proposed Transfer of any Restricted Securities, unless there is in effect a registration statement under the Securities Act covering the proposed transaction (and the proposed transaction is made in accordance with such registration statement), the holder thereof shall give written notice to the Company of such holder's intention to effect such Transfer ("**Transfer Notice**"). Each such Transfer Notice shall describe the manner and circumstances of the proposed Transfer in sufficient detail and, if reasonably requested by the Company, shall be accompanied, at such holder's expense, by either (x) a written opinion of legal counsel who shall, and whose legal opinion shall, be reasonably satisfactory to the Company, addressed to the Company, to the effect that the proposed Transfer may be effected without registration under the Securities Act, (y) a "no action" letter from the SEC to the effect that the proposed Transfer without registration will not result in a recommendation by the staff of the SEC that action be taken with respect thereto, or (z) any other evidence reasonably satisfactory to legal counsel for the Company to the effect that the proposed Transfer may be effected without registration under the Securities Act, whereupon the holder of such Restricted Securities shall be entitled to Transfer such Restricted Securities in accordance with the terms of the applicable Transfer Notice given by such holder to the Company. The Company will not require such a legal opinion or "no action" letter (x) in any transaction in compliance with Rule 144; or (y) in any transaction in which such Holder distributes Restricted Securities to an Affiliate of such Holder for no consideration. Each certificate evidencing any Restricted Securities that are Transferred as provided in this Section 2.12(c) shall bear, except if such Transfer is made pursuant to Rule 144, the appropriate restrictive legends set forth or described in Section 2.12(b), except that such certificate shall not bear such restrictive legends if, in the opinion of legal counsel for such Transferring holder and legal counsel for the Company, such legends are not required in order to establish compliance with any provisions of applicable securities laws, including the Securities Act.

2.13 Assignment of Registration Rights. The right of any Holder to request registration or inclusion of Registrable Securities in any registration pursuant to Section 2.1 or Section 2.2 (collectively, "**Registration Rights**") may be assigned (but only with all related obligations) by such Holder to a transferee of Registrable Securities that (x) after such Transfer, holds at least 450,000 shares of Registrable Securities, (y) is an Affiliate of such Holder, or (z) is such Holder's Immediate Family Member or trust for the benefit of such individual Holder (or one or more of his or her Immediate Family Members); provided, however, that (i) such Transfer of Registrable Securities is effected in accordance with Sections 2.12 and 8.14 and all applicable securities laws, (ii) before such Transfer of Registrable Securities, such Holder gives the Company written notice stating the name and address of such transferee and identifying the securities of the Company with

respect to which Registration Rights are intended to be assigned, (iii) such transferee of Registrable Securities agrees, in a written instrument delivered to the Company, to receive such assigned Registration Rights subject to all of the terms and conditions hereof, including the provisions of Section 2.11, and (iv) such transferee of Registrable Securities is not deemed by the Board, in its reasonable judgment, to be a competitor of the Company or a director, officer, employee or holder of more than 10% of a competitor of the Company, provided, however, that none of Pfizer, Viking, or any of their respective Affiliates shall be deemed to be a competitor of the Company for purposes of this Agreement.

2.14 Termination of Registration Rights. The Registration Rights shall automatically terminate and be of no further force or effect upon the earliest to occur of: (i) the dissolution or winding up of the Company; (ii) immediately before the consummation of a Deemed Liquidation Event; (iii) such time as Rule 144 or another similar exemption under the Securities Act is available for the sale of all Registrable Securities proposed to be sold by such Holder without limitation during a three-month period; and (iv) the 5-year anniversary of the Company IPO.

3. Information Rights.

3.1 Delivery of Financial Statements. The Company shall deliver to each Major Investor:

(a) as soon as practicable, but in any event within one hundred twenty (120) days after the end of each fiscal year of the Company (i) a balance sheet as of the end of such year, (ii) statements of income and of cash flows for such year, and (iii) a statement of stockholders' equity as of the end of such fiscal year, all such financial statements to be in reasonable detail, and prepared in accordance with generally accepted accounting principles ("GAAP"), and audited and certified by an independent public accounting firm of nationally recognized standing approved by the Board (including at least one Preferred Director);

(b) as soon as practicable, but in any event within forty-five (45) days after the end of each quarter of each fiscal year of the Company, unaudited statements of income and cash flows for such fiscal quarter, and an unaudited balance sheet as of the end of such fiscal quarter, all prepared in accordance with GAAP (except that such financial statements may (i) be subject to normal year-end audit adjustments; and (ii) not contain all notes thereto that may be required in accordance with GAAP);

(c) as soon as practicable, but in any event at least thirty (30) days prior to the end of each fiscal year, a budget and business plan for the next fiscal year, prepared on a monthly basis, including balance sheets, income statements and statements of cash flows for such months and, as soon as prepared, any other budgets or revised budgets prepared by the Company;

(d) such other information relating to the financial condition, business, prospects, or corporate affairs of the Company as any Major Investor may from time to time reasonably request; provided, however, that the Company shall not be obligated under this Subsection 3.1 to provide information (i) that the Company reasonably determines in good faith to be a trade secret or confidential or commercially sensitive information (unless covered by a confidentiality agreement, in a form reasonably acceptable to the Company, including in a form as set forth in Section 3.4); or (ii) the disclosure of which would adversely affect the attorney-client privilege between the Company and its counsel.

If, for any period, the Company has any subsidiary whose accounts are consolidated with those of the Company, then in respect of such period the financial statements delivered pursuant to the foregoing sections shall be the consolidated and consolidating financial statements of the Company and all such consolidated subsidiaries.

Notwithstanding anything else in this Subsection 3.1 to the contrary, the Company may cease providing the information set forth in this Subsection 3.1 during the period starting with the date sixty (60) days before the Company's good-faith estimate of the date of filing of a registration statement if it reasonably concludes it must do so to comply with the SEC rules applicable to such registration statement and related offering; provided that the Company's covenants under this Subsection 3.1 shall be reinstated at such time as the Company is no longer actively employing its commercially reasonable efforts to cause such registration statement to become effective.

3.2 Inspection. The Company shall permit each Major Investor, at such Major Investor's expense, to visit and inspect the Company's properties; examine its books of account and records; and discuss the Company's affairs, finances, and accounts with its officers, during normal business hours of the Company as may be reasonably requested by the Major Investor; provided, however, that the Company shall not be obligated pursuant to this Subsection 3.2 to provide access to any information that it reasonably and in good faith considers to be a trade secret or confidential or commercially sensitive information (unless covered by a confidentiality agreement, in form reasonably acceptable to the Company, including in a form as set forth in Section 3.4) or the disclosure of which would adversely affect the attorney-client privilege between the Company and its counsel.

3.3 Termination of Information. The covenants set forth in Subsection 3.1 and Subsection 3.2 shall terminate and be of no further force or effect (i) immediately before the consummation of the Company IPO; (ii) upon the consummation of a Deemed Liquidation Event; or (iii) when the Company first becomes subject to the periodic reporting requirements of Section 12(g) or 15(d) of the Exchange Act, whichever event occurs first.

3.4 Confidentiality. Each Investor agrees that such Investor will keep confidential and will not disclose, divulge or use for any purpose (other than to monitor such Investor's investment in the Company) any confidential information obtained from the Company pursuant to this Agreement (including notice of the Company's intention to file a registration statement), unless such confidential information (x) is known or becomes known to the public in general (other than as a result of a breach or violation by such Investor or any of its Affiliates or representatives of this Section 3.4 or any other non-use or confidentiality obligation), (y) is or has been independently developed or conceived by such Investor without use of, derivation from, reference to or reliance upon any of the Company's confidential information and without violating any of the confidentiality obligations hereunder or any other non-use or confidentiality obligation, or (z) is or has been made known or disclosed to such Investor by a third party without a breach of any legal, fiduciary, contractual or other obligation of confidentiality such third party may have to the Company; provided, however, that an Investor may disclose the

Company's confidential information (i) to such Investor's attorneys, accountants, consultants, advisors and other professionals to the extent necessary to obtain their services in connection with monitoring such Investor's investment in the Company, provided that such Investor informs each such individual that such information is confidential and that by receiving such information such individual is agreeing to maintain the confidentiality of such information, (ii) to any Affiliate, current and prospective partner, member, stockholder or wholly owned subsidiary of such Investor in the ordinary course of business, provided that such Investor informs such Person that such information is confidential and directs such Person to maintain the confidentiality of such information, (iii) with prior notification to the Company, to any prospective purchaser of any Registrable Securities from such Investor, provided that such prospective purchaser agrees, in writing, to be bound by provisions not less restrictive than those set forth in this Section 3.4, or (iv) as may be required by applicable law, provided that such Investor delivers to the Company advance written notice of such disclosure and exercises commercially reasonable efforts to minimize the extent of any such required disclosure and obtain assurance that confidential treatment will be accorded to the disclosed information.

3.5 Auditor Independence. The Company shall be reasonably responsive to requests for information from the Investor relating to issues that may impact auditor independence rules applicable to the Investor.

4. Rights to Future Stock Issuances.

4.1 Right of First Refusal. If the Company proposes to offer or sell any New Securities, the Company shall first offer such New Securities to the Major Investors in accordance with the terms and conditions of this Section 4.1 and subject to applicable securities laws (the "**Right of First Refusal**").

(a) The Company shall give written notice (the "**Offer Notice**") to each Major Investor, stating (i) its bona fide intention to offer such New Securities, (ii) the type and number of such New Securities to be offered (the "**Offered Shares**"), and (iii) the price and general terms, if any, upon which it proposes to offer such New Securities.

(b) Each Major Investor, by written notice to the Company (the "**Election Notice**") given no later than the twentieth day after the date on which the Offer Notice is, pursuant to Section 8.5, deemed to have been delivered to such Major Investor (such twentieth day, the "**Initial Offer Deadline**"), may elect to purchase or acquire, at the price and on the general terms specified in the Offer Notice, up to that portion of the Offered Shares which equals the proportion that the Common Stock issued and then held, or issuable (directly or indirectly) upon conversion and/or exercise, as applicable, of the Preferred Stock then held by such Major Investor bears to the total Common Stock then outstanding (assuming full conversion and/or exercise, as applicable, of all Preferred Stock). Each Election Notice shall specify the number of Offered Shares that such Major Investor is electing to purchase or acquire. Promptly after the Initial Offer Deadline, the Company shall give written notice to each Major Investor that has elected to purchase or acquire all of the Offered Shares available to such Major Investor (each, a "**Fully Exercising Investor**") of any other Major Investor's failure to do likewise (the "**Second Offer Notice**"). Each Fully Exercising Investor may, by giving written notice to the Company (the "**Second Election Notice**") during the ten-day period commencing on the date on which the Second Offer Notice is, pursuant

to Section 8.5, deemed to have been delivered to such Fully Exercising Investor (such ten-day period, the “*Second Offer Period*”), elect to purchase or acquire, in addition to the number of Offered Shares such Fully Exercising Investor has already elected to purchase or acquire and at the same price and on the general terms specified in the Offer Notice, up to that portion of the Offered Shares for which Major Investors were entitled to subscribe but that were not subscribed for by the Major Investors by the Initial Offer Deadline (the “*Unsubscribed Shares*”) which equals the proportion that the Common Stock issued and then held, or issuable (directly or indirectly) upon conversion and/or exercise, as applicable, of the Preferred Stock then held, by such Fully Exercising Investor bears to the total Common Stock issued and then held, or issuable (directly or indirectly) upon conversion and/or exercise, as applicable, of the Preferred Stock then held by all of the Fully Exercising Investors who elect to purchase or acquire Unsubscribed Shares. Each Second Election Notice shall specify the number of Unsubscribed Shares that such Fully Exercising Investor is electing to purchase or acquire. The closing of any sale of New Securities pursuant to this Section 4.1(b) shall occur on or before the later of (i) 90 days after the last date on which the Offer Notice is, pursuant to Section 8.5, deemed to have been delivered to all Major Investors and (ii) the date of initial sale of New Securities pursuant to Section 4.1(c).

(c) If all Offered Shares are not elected to be purchased or acquired as provided in Section 4.1(b), the Company may, during the 90-day period following the expiration of the Second Offer Period for all Fully Exercising Investors, offer and sell the remaining unsubscribed portion of such Offered Shares to any Person or Persons (the “*Offerees*”) at a price not less than, and upon terms not more favorable than, specified in the Offer Notice. If the Company does not enter into a written agreement with the Offerees for the sale of New Securities within such 90-day period, or if the sale of such New Securities pursuant to such agreement is not consummated within 30 days after the execution thereof, the Right of First Refusal shall be deemed to be revived and such New Securities shall not be offered or sold to any Person or Persons unless first reoffered to the Major Investors in accordance with this Section 4.1.

(d) The Right of First Refusal shall not be applicable to: (i) Exempted Securities (as defined in the Restated Charter); (ii) securities of the Company which are otherwise excluded from the Right of First Refusal by the affirmative vote or consent of the holders of a majority of all shares of Preferred Stock then outstanding; (iii) shares of Common Stock issued in the Company IPO, or (iv) the issuance of shares of Series C Preferred Stock pursuant to Subsection 1.2(c) or Subsection 1.2(d) of the Series C Purchase Agreement. In the event the Right of First Refusal under this Section 4 is waived with respect to an offering of New Securities without a Major Investor’s prior written consent and any party that participated in waiving such rights actually purchases New Securities in such offering, the Company shall grant to any such non-waiving Major Investor the right to purchase, in a subsequent closing of such issuance on substantially the same terms and conditions, the same percentage of its full pro rata share of such New Securities as the highest percentage of any such purchasing waiving party.

(e) Notwithstanding any provision hereof to the contrary, no Major Investor shall have any right to purchase or acquire any New Securities pursuant to this Section 4.1 if such Major Investor cannot demonstrate to the Company’s reasonable satisfaction that such Major Investor is, at the time of the proposed issuance of such New Securities, an “accredited investor” within the meaning of SEC Rule 501 of Regulation D, as then in effect.

4.2 Assignment of Right of First Refusal. The Right of First Refusal may be assigned (but only with all related obligations) by any Major Investor to a transferee of Registrable Securities that (x) after such Transfer, holds at least 450,000 shares of Registrable Securities, (y) is an Affiliate of such Major Investor, or (z) is such Major Investor's Immediate Family Member or trust for the benefit of such individual Major Investor (or one or more of his or her Immediate Family Members); provided, however, that (i) such Transfer of Registrable Securities is effected in accordance with Sections 2.12 and 8.14 and all applicable securities laws, (ii) before such Transfer of Registrable Securities, such Major Investor gives the Company written notice stating the name and address of such transferee and identifying the securities of the Company with respect to which the Right of First Refusal is intended to be assigned, (iii) such transferee of Registrable Securities agrees, in a written instrument delivered to the Company, to receive such assigned Right of First Refusal subject to all of the terms and conditions hereof and (iv) such transferee of Registrable Securities is not deemed by the Board, in its reasonable judgment, to be a competitor of the Company or a director, officer, employee or holder of more than 10% of a competitor of the Company; provided, however, none of Viking, Pfizer or any of their respective Affiliates shall be deemed to be a competitor of the Company for purposes of this Agreement.

4.3 Termination of Right of First Refusal. The covenants set forth in Section 4.1 shall automatically terminate and be of no further force or effect upon the earliest to occur of: (i) immediately before the consummation of the Company IPO; (ii) when the Company first becomes subject to the periodic reporting requirements of Section 12(g) or Section 15(d) of the Exchange Act; (iii) the dissolution or winding up of the Company; and (iv) immediately before the consummation of a Deemed Liquidation Event.

5. Additional Covenants.

5.1 Employee Agreements. The Company shall cause each individual now or hereafter employed by it or any of its subsidiaries (or engaged by the Company or any of its subsidiaries as a consultant or independent contractor) with access to the Company's trade secrets and/or confidential information to enter into a confidential information and invention assignment agreement, substantially in the form made available to the Investors.

5.2 Matters Requiring Preferred Director Approval. So long as there is at least one Preferred Director serving on the Board, the Company hereby covenants and agrees with each Investor that it shall not, without approval of the Board, which approval must include the affirmative vote of at least one Preferred Director:

(a) make, or permit any of its subsidiaries to make, any loan or advance to, or own any stock or other securities of, any subsidiary or other corporation, partnership or other entity unless it is wholly owned by the Company;

(b) make, or permit any of its subsidiaries to make, any loan or advance to any person or entity, including any director or employee, except advances and similar expenditures in the ordinary course of business or under the terms of an employee stock or option plan approved by the Board;

(c) guarantee (directly or indirectly), or permit any of its subsidiaries to guarantee (directly or indirectly), any indebtedness, except for trade accounts of the Company or any of its subsidiaries arising in the ordinary course of business;

(d) enter into, or be a party to, any transaction with any director, officer or employee of the Company or any “associate” (as defined in Rule 12b 2 promulgated under the Exchange Act) of any such person or entity, except for (x) transactions contemplated by the Transaction Agreements (as defined in the Series C Purchase Agreement) or (y) transactions made in the ordinary course of business and pursuant to reasonable requirements of the Company’s business and upon fair and reasonable terms that are approved by a majority of the Board;

(e) hire, terminate or change the compensation of the Company’s executive officers, including approving any option grants or stock awards to such executive officers, or paying bonuses in excess of 20% of base compensation (such approval not to be unreasonably withheld);

(f) change the Company’s principal business, enter new lines of business or exit the Company’s current lines of business; or

(g) sell, assign, license, pledge or encumber material technology or intellectual property, other than (i) licenses granted in the ordinary course of business, (ii) in connection with a Deemed Liquidation Event or (iii) in connection with equipment leasing transactions of less than \$100,000 in the aggregate, in each case as approved by the Board.

5.3 D&O Insurance. The Company shall use its best efforts to maintain in full force and effect directors and officers insurance in the amount of at least three million dollars (\$3,000,000) (or such greater amount as determined by the Board), as determined by the Board and covering such risks as are adequate and customary for its size and business, each with financially sound and reputable insurance companies or associations; provided, however, that the Company shall not terminate or reduce such directors and officers insurance to less than three million dollars (\$3,000,000) without the prior written consent of Pfizer.

5.4 Real Property Holding Corporation Notification. The Company shall notify the Investors promptly following any “determination date” (as defined in Treasury Regulations section 1.897-2(c)(1)) or otherwise within five (5) business days of becoming aware that the Company is, or is reasonably likely to be deemed to be, a “United States real property holding corporation” within the meaning of Section 897(c)(2) of the U.S. Internal Revenue Code of 1986, as amended. In addition, at any time upon an Investor’s reasonable request, the Company shall issue a statement to the Investor, in form and substance as described in Treasury Regulations sections 1.897-2(h)(1) and 1.1445-2(c) (or any successor regulations) and signed under penalties of perjury, regarding whether any interest in the Company constitutes a “U.S. real property interest” within the meaning of Section 897(c) of the Code, together with an executed notice to the Internal Revenue Services described in Treasury Regulations section 1.897-2(h)(2) (or any successor regulation). Such statement shall be delivered within ten (10) business days of the Investor’s written request therefor.

5.5 **Termination.** The covenants set forth in this Section 5 shall terminate and be of no further force or effect upon the earliest to occur of: (i) immediately before the consummation of the Company IPO; (ii) the dissolution or winding up of the Company; and (iii) immediately before the consummation of a Deemed Liquidation Event.

6. **Voting Provisions Regarding Board of Directors.**

6.1 **Board Composition.** Each Stockholder agrees to vote, or cause to be voted, all Voting Shares owned by such Stockholder, or over which such Stockholder has voting control, from time to time and at all times, in whatever manner as shall be necessary to ensure that, at each annual or special meeting of the Company's stockholders at which an election of directors is held or pursuant to any written consent of the Company's stockholders, the following individuals shall be elected to the Board:

(a) one individual designated by Pfizer (the "**Series A-1 Director**"), which individual shall initially be William Burkoth, for so long as Pfizer and its Affiliates continue to own beneficially 25% of the shares of Series A-1 Preferred Stock originally issued pursuant to that certain Series A-1 Preferred Stock Purchase Agreement, dated as of October 6, 2015, by and among the Company and the Investors (as defined therein) party thereto;

(b) one individual designated by the holders of a majority of the Series B Preferred Stock (the "**Series B Director**"), which individual shall initially be Tony Yao, for so long as at least 916,380 shares of Series B Preferred Stock remain issued and outstanding;

(c) one individual designated by the holders of a majority of the Series C Preferred Stock (the "**Series C Director**," together with the Series A-1 Director and the Series B Director, the "**Preferred Directors**"), which seat shall initially be vacant, for so long as at least 777,778 shares of Series C Preferred Stock remain issued and outstanding;

(d) two individuals designated by the holders of a majority of the outstanding shares of the Common Stock (other than (i) any Common Stock issued or issuable upon conversion of the Preferred Stock or (ii) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right or other security that is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, the shares referenced in clause (i) above) (the "**Common Directors**"), which individuals shall initially be David Kim and David Schaffer; and

(e) three individuals who are not otherwise Affiliates (as defined below) of the Company or of any Investor (the "**Independent Directors**"), (i) the first of whom shall be proposed by the Company subject to the approval of a majority of the other members of the Board, which approval shall not be unreasonably withheld or delayed, which individual shall initially be Charles Theuer, (ii) the second of whom shall be an individual that satisfies the independence, financial literacy and financial expertise requirements to serve as an audit committee chairperson pursuant to relevant SEC, New York Stock Exchange and Nasdaq laws and regulations, and mutually acceptable to a majority of the other members of the Board, which individual shall initially be Jacob Chacko, and (iii) the third of whom shall be mutually agreed upon by a majority of the other members of the Board, which approval shall not be unreasonably withheld or delayed, which shall initially be left vacant.

To the extent that any of clauses (a) through (d) above shall not be applicable, any member of the Board who would otherwise have been designated in accordance with the terms thereof shall instead be elected by all of the Company's stockholders entitled to vote thereon in accordance with, and pursuant to, the Restated Charter. The Company will fill vacancies on the Board as soon as practicable and in any event within twelve (12) months after the Initial Closing (as defined in the Series C Purchase Agreement). The parties acknowledge that additional seats on the Board shall be determined in connection with future financing and other strategic transactions involving the Company, and to satisfy other needs of the Company for independent directors, and as determined by the Board, may provide for rights to designate directors similar to the rights provided to Pfizer and the holders of a majority of the outstanding shares of Series C Preferred Stock under this Section 6.

6.2 Failure to Designate a Board Member. In the absence of any designation from the Persons or groups with the right to designate a director as specified in Section 6.1, the director previously designated by them and then serving shall be reelected if still eligible to serve as provided herein.

6.3 Removal of Board Members. Each Stockholder agrees to vote, or cause to be voted, all Voting Shares owned by such Stockholder, or over which such Stockholder has voting control, from time to time and at all times, in whatever manner as shall be necessary to ensure that:

(a) no director elected pursuant to Section 6.1 or Section 6.2 may be removed from office unless (i) such removal is directed or approved by the affirmative vote of the Person, or of the holders of a majority of the shares of stock, entitled under Section 6.1 to designate that director or (ii) the Person(s) originally entitled to designate or approve such director pursuant to Section 6.1 is no longer so entitled to designate or approve such director;

(b) any vacancies created by the resignation, removal or death of a director elected pursuant to Section 6.1 or Section 6.2 shall be filled pursuant to the provisions of this Section 6; and

(c) upon the written request of any party entitled to designate a director as provided in Section 6.1(a), Section 6.1(b) or Section 6.1(c) to remove such director, such director shall be removed.

All Stockholders agree to execute any written consents required to perform their obligations as set forth in this Agreement, and the Company agrees, at the written request of any party entitled to designate directors, to call a special meeting of the Company's stockholders for the purpose of electing directors.

6.4 No Liability for Election of Recommended Directors. No Stockholder, nor any Affiliate of any Stockholder, shall have any liability as a result of designating an individual for election as a director for any act or omission by such designated individual in his or her capacity as a director of the Company, nor shall any Stockholder have any liability as a result of voting for any such designee in accordance with the provisions of this Agreement.

6.5 **No “Bad Actor” Designees.** Each Person or group with the right to designate, or participate in the designation of, a director as specified in Section 6.1 (each, a “**Designator**”) hereby represents and warrants to the Company that, to such Designator’s knowledge, none of the “bad actor” disqualifying events described in Rule 506(d)(1)(i)-(viii) promulgated under the Securities Act (each, a “**Disqualification Event**”), is applicable to such Designator’s initial designee named in Section 6.1, except, if applicable, for a Disqualification Event as to which Rule 506(d)(2)(ii) or (iii) or (d)(3) is applicable. Any director designee to whom any Disqualification Event is applicable, except for a Disqualification Event as to which Rule 506(d)(2)(ii) or (iii) or (d)(3) is applicable, is hereinafter referred to as a “**Disqualified Designee.**” Each Designator hereby covenants and agrees (i) not to designate, or participate in the designation of, any director designee who, to such Designator’s knowledge, is a Disqualified Designee and (ii) that, in the event such Designator becomes aware that any individual previously designated by any such Designator is or has become a Disqualified Designee, such Designator shall, as promptly as practicable, take such actions as are necessary to remove such Disqualified Designee from the Board and designate a replacement designee who is not a Disqualified Designee.

7. Drag-Along Right; Vote to Increase Common Stock.

7.1 Definitions

(a) “**Sale of the Company**” means either (i) a Stock Sale (as defined below) or (ii) a Deemed Liquidation Event.

(b) “**Stock Sale**” means a change in ownership of the Company, other than a Deemed Liquidation Event, that occurs when one Person, or more than one Person acting as a group, acquires ownership of stock of the Company, in a stock sale or exchange, that, together with the stock held by such Person or group, constitutes more than 50% of the total voting power of the stock of the Company; provided, however, that a Stock Sale will not occur if any Person, or more than one Person acting as a group, owns more than 50% of the total voting power of the stock of the Company and acquires additional stock of the Company; provided, further, that any change in the ownership of the stock of the Company as a result of a bona fide equity financing of the Company that is approved by the Board will not be considered a Stock Sale.

(c) “**Subject Shares**” means all securities of the Company, including securities of the Company acquired upon exercise or conversion of any options, warrants or other convertible securities.

7.2 Actions to be Taken. In the event that the holders of (i) a majority of the then outstanding shares of Common Stock and (ii) a majority of the then outstanding shares of Preferred Stock (voting together as a single class on an as converted to Common Stock basis) (the “**Selling Stockholders**”) approve a Sale of the Company, in writing, specifying that this Section 7 shall apply to such transaction, then the Company and each Stockholder hereby agrees:

(a) if such transaction requires stockholder approval, with respect to all Voting Shares owned by such Stockholder, or over which such Stockholder has voting control, to vote (in person, by proxy or by written consent, as applicable) such Voting Shares in favor of such Sale of the Company (together with any related amendment to the Restated Charter required in order to implement such Sale of the Company) and in opposition to any and all other proposals that could reasonably be expected to delay or impair the ability of the Company or its stockholders to consummate such Sale of the Company;

(b) to sell or exchange all Subject Shares that such Stockholder then beneficially holds pursuant to the terms and conditions of such Deemed Liquidation Event or, in the case of a Stock Sale, to sell or otherwise transfer to the acquiring Person all Subject Shares that such Stockholder then beneficially holds (or in the event that the Selling Stockholders are selling fewer than all of their Subject Shares, shares in the same proportion as the Selling Stockholders are selling to the acquiring Person) for the same per share consideration in accordance with the provisions of the Restated Charter, and on the same terms and conditions (except as otherwise permitted by Section 7.3), as the Selling Stockholders;

(c) to refrain from exercising any dissenters' rights or rights of appraisal under applicable law (if any) with respect to such Sale of the Company;

(d) to execute and deliver all related documentation and take such other actions as may be reasonably requested, in writing, by the Company or the Selling Stockholders in support of such Sale of the Company, including executing and delivering instruments of conveyance and transfer, any purchase agreement, merger agreement, indemnity agreement, escrow agreement, consent, waiver, governmental filing and share certificates duly endorsed for transfer (free and clear of impermissible liens, claims and encumbrances), and any similar or related documents;

(e) to refrain from entering into any agreement or understanding (including any proxy or voting trust) that would be inconsistent with, or violate, the provisions of this Section 7, unless specifically requested to do so, in writing, by the acquiring Person in connection with such Sale of the Company; and

(f) in the event that a stockholder representative (the "**Stockholder Representative**") is appointed with respect to matters affecting the Company's stockholders under the applicable definitive transaction agreements relating to such Sale of the Company, (i) to consent to (x) the appointment of such Stockholder Representative, (y) the establishment of any applicable escrow, expense or similar fund in connection with any indemnification or similar obligations, and (z) the payment of such Stockholder's pro rata portion (from the applicable escrow or expense fund or otherwise) of any and all of such Stockholder Representative's reasonable fees and expenses arising out of such Stockholder Representative's services and duties as the representative of the Company's stockholders in connection with such Sale of the Company, and (ii) not to assert any claim, or commence any suit, against the Stockholder Representative or any other stockholder of the Company with respect to any action or inaction by the Stockholder Representative in connection with his or her service as the Stockholder Representative, absent fraud, gross negligence or willful misconduct.

The provisions of this Section 7 shall (i) (x) with respect to Theresa Janke, supersede and replace the provisions of Section 12 of that certain Contribution Agreement made and entered into as of March 20, 2015 by and between the Company and Theresa Janke and (y) with respect to Melissa

Kotterman, supersede and replace the provisions of Section 12 of that certain Contribution Agreement made and entered into as of March 20, 2015 by and between the Company and Melissa Kotterman and (ii) not be deemed to require any Stockholder to approve any amendment or waiver of any provision of the Restated Charter or otherwise approve a Sale of the Company that would not allocate the consideration in accordance with the Restated Charter.

7.3 Exceptions. Notwithstanding the foregoing, a Stockholder's obligations pursuant to Section 7.2 in connection with any proposed Sale of the Company (the "**Proposed Sale**") shall be subject to the following conditions:

(a) any representations and warranties to be made by such Stockholder in connection with the Proposed Sale are limited to representations and warranties related to authority, ownership and the ability to convey title to the Stockholder's Shares, including, but not limited to, representations and warranties that (i) the Stockholder holds all right, title and interest in and to the Shares such Stockholder purports to hold, free and clear of all liens and encumbrances, (ii) the obligations of the Stockholder in connection with the transaction have been duly authorized, if applicable, (iii) the documents to be entered into by the Stockholder have been duly executed by the Stockholder and delivered to the acquirer and are enforceable against the Stockholder in accordance with their respective terms; and (iv) neither the execution and delivery of documents to be entered into in connection with the Proposed Sale, nor the performance of the Stockholder's obligations thereunder, will cause a breach or violation of the terms of any agreement, law or judgment, order or decree of any court or governmental agency;

(b) the Stockholder shall not be liable for the inaccuracy of any representation or warranty made by any other Person in connection with the Proposed Sale, other than the Company (except to the extent that funds may be paid out of an escrow established to cover breach of representations, warranties and covenants of the Company as well as breach by any stockholder of any of identical representations, warranties and covenants provided by all stockholders);

(c) the liability for indemnification, if any, of such Stockholder in the Proposed Sale, and for the inaccuracy of any representations and warranties made by the Company or its stockholders in connection with the Proposed Sale, shall be several and not joint with any other Person (except to the extent that funds may be paid out of an escrow established to cover breach of representations, warranties and covenants of the Company as well as breach by any stockholder of any identical representations, warranties and covenants provided by all stockholders) and, subject to any provisions of the Restated Charter relating to the allocation of the escrow, shall be pro rata in proportion to, and shall not exceed, the amount of consideration paid to such Stockholder in connection with the Proposed Sale.

(d) other than liability in respect of actions or omissions of, or representations and warranties made solely by and with respect to, such Stockholder, liability shall be limited to such Stockholder's applicable share (determined based on the respective proceeds payable to each Stockholder in connection with such Proposed Sale in accordance with the provisions of the Restated Certificate) of a negotiated aggregate indemnification amount that applies equally to all Stockholders but that in no event exceeds the amount of consideration otherwise payable to such Stockholder in connection with such Proposed Sale, except with respect to claims related to fraud by such Stockholder, the liability for which need not be limited as to such Stockholder;

(e) as a result of the Proposed Sale, (i) each holder of each class or series of capital stock of the Company shall be entitled to receive the same form of consideration (and be subject to the same indemnity and escrow provisions) for their shares of such class or series as is received by other holders with respect to their shares of such same class or series of stock, (ii) each holder of a series of Preferred Stock of the Company shall receive the same amount of consideration per share of such series of Preferred Stock of the Company as is received by other holders with respect to their shares of such same series, (iii) each holder of Common Stock shall receive the same amount of consideration per share of Common Stock as is received by other holders with respect to their shares of Common Stock, and (iv) unless the holders of each series of Preferred Stock agree otherwise by legally sufficient amendment or waiver of the provisions of the Restated Charter then in effect, the aggregate consideration receivable by all holders of Common Stock and Preferred Stock of the Company shall be allocated among the holders of Common Stock and Preferred Stock of the Company on the basis of the relative liquidation preferences to which the holders of each respective series of Preferred Stock of the Company and the holders of Common Stock are entitled in a Deemed Liquidation Event (assuming for this purpose that the Proposed Sale is a Deemed Liquidation Event) in accordance with the Restated Charter in effect immediately prior to the Proposed Sale; provided, however, that, notwithstanding the foregoing, if the consideration to be paid in exchange for the Subject Shares pursuant to the Proposed Sale includes any securities and due receipt thereof by such Stockholder would require, under applicable law, (x) the registration or qualification of such securities or of any Person as a broker, dealer or agent with respect to such securities or (y) the provision to such Stockholder of any information other than such information as a prudent issuer would generally furnish in an offering made solely to “accredited investors” as defined in Regulation D promulgated under the Securities Act, then the Company may cause to be paid to such Stockholder, in lieu of such securities, against surrender of the Subject Shares which would have otherwise been sold by such Stockholder, an amount in cash equal to the fair market value (as determined in good faith by the Company) of the securities that such Stockholder would otherwise receive as of the date of issuance of such securities in exchange for such Stockholder’s Subject Shares;

(f) subject to clause (e) above, requiring the same form of consideration to be available to the holders of any single class or series of capital stock, if any holders of any capital stock of the Company are given an option as to the form and amount of consideration to be received as a result of the Proposed Sale, all holders of such capital stock will be given the same option; provided, however, that nothing in this Section 7.3(f) shall entitle any holder to receive any form of consideration that such holder would be ineligible to receive as a result of such holder’s failure to satisfy any condition, requirement or limitation that is generally applicable to the Company’s stockholders;

(g) no Stockholder or its affiliates shall be required to agree (unless such Stockholder is a Company officer or employee) to any restrictive covenant in connection with the Proposed Sale (including without limitation any covenant not to compete or covenant not to solicit customers, employees or suppliers of any party to the Proposed Sale); and

(h) no Stockholder or its affiliates shall be required to amend, extend or terminate any commercial, contractual or other relationship with the Company, the acquirer or their respective affiliates, except that the Stockholder may be required to agree to terminate the investment-related documents between or among such Stockholder, the Company and/or other stockholders of the Company.

7.4 Restrictions on Sales of Control of the Company. No Stockholder shall be a party to any Stock Sale unless all holders of Preferred Stock are allowed to participate in such transaction and the consideration received pursuant to such transaction is allocated among the parties thereto in the manner specified in the Restated Certificate in effect immediately prior to the Stock Sale (as if such transaction were a Deemed Liquidation Event), unless (i) a majority of the then outstanding shares of Preferred Stock, voting together as a single class on an as-converted to Common Stock basis, and (ii) a majority of the then outstanding shares of Series C Preferred Stock and Series B Preferred Stock, voting together as a single class and on an as-converted to Common Stock basis, elect otherwise by written notice given to the Company at least ten (10) days prior to the effective date of any such transaction or series of related transactions.

7.5 Vote to Increase Authorized Common Stock. Each Stockholder agrees to vote, or cause to be voted, all Voting Shares owned by such Stockholder, or over which such Stockholder has voting control, from time to time and at all times, in whatever manner as shall be necessary to increase the number of authorized shares of Common Stock from time to time to ensure that there will be sufficient shares of Common Stock available for conversion of all shares of Preferred Stock outstanding at any given time.

7.6 Remedies.

(a) Irrevocable Proxy and Power of Attorney. Each Stockholder hereby constitutes and appoints as such Stockholder's proxy, and hereby grants a power of attorney to, the Company's Chief Executive Officer with full power of substitution, to represent and to vote or act by written consent with respect to all securities of the Company that such Stockholder beneficially holds, either as of the date of this Agreement or at any time thereafter (collectively, the "**Proxy Shares**"), in accordance with Section 6 or this Section 7, if and only if such Stockholder or any transferee of any Proxy Shares (i) fails to vote all of the Proxy Shares in accordance with Section 6 or this Section 7, (ii) attempts to vote any of the Proxy Shares (whether in person, by proxy or by written consent) in a manner that is inconsistent with Section 6 or this Section 7, or (iii) fails to take any action necessary to effect the provisions of Section 6 or this Section 7. Each proxy and power of attorney granted pursuant to the immediately preceding sentence is given to secure the performance of each Stockholder's duties under Section 6 and this Section 7, and each Stockholder shall take such further action and execute such other instruments as may be necessary to effectuate the intent of such Stockholder's proxy. Each proxy and power of attorney is coupled with an interest, shall be irrevocable and shall be valid for so long as any of the Proxy Shares are outstanding until the covenants set forth in this Section 7 terminate or expire pursuant to Section 7.8. The authority vested in each proxy shall run with the Proxy Shares regardless of any change in legal ownership thereof. The power of attorney granted by each Stockholder herein is a durable power of attorney and shall survive such Stockholder's bankruptcy, death or incapacity. Each Stockholder hereby revokes any and all previous proxies and powers of attorney with respect to the Proxy Shares. Each Stockholder and each subsequent holder of any Proxy Shares shall not hereafter, unless and until the covenants set forth in Section 6 and this Section 7 terminate or expire pursuant to Section 7.8, (x) purport to grant any other proxy or power of attorney with respect to any of the Proxy Shares, (y) deposit any of the Proxy Shares into a

voting trust, or (z) enter into any agreement, arrangement or understanding with any Person (other than the Company), directly or indirectly, to vote, grant any proxy or give instructions with respect to the voting of any of the Proxy Shares, in each case, with respect to any of the matters set forth in Section 6 or this Section 7.

7.7 Equitable Relief. Each party acknowledges and agrees that any breach or threatened breach of the covenants set forth in Section 6 or this Section 7 will cause irreparable injury and that money damages will not provide an adequate remedy. Accordingly, it is agreed that each party hereto shall be entitled to an injunction to prevent breaches of the covenants set forth in Section 6 or this Section 7 or other equitable relief (including specific performance in any action instituted in any court of the United States or any state having subject matter jurisdiction). The aforementioned equitable relief shall be in addition to, and not in lieu of, legal remedies, monetary damages or other available forms of relief.

7.8 Termination. The covenants set forth in Section 6 and this Section 7 shall automatically terminate and be of no further force or effect upon the earliest to occur of: (i) immediately before the consummation of the Company IPO; (ii) the dissolution or winding up of the Company; (iii) the consummation of a Deemed Liquidation Event or a Sale of the Company, with distribution of proceeds to, or escrow for the benefit of, the Company's stockholders in accordance with the Restated Charter; provided that the provisions of this Section 7 will continue after the closing of any Sale of the Company to the extent necessary to enforce the provisions of this Section 7 with respect to such Sale of the Company.

8. Miscellaneous.

8.1 Successors and Assigns. Except as otherwise provided herein, this Agreement, and any and all rights, duties and obligations hereunder, shall not be assigned, transferred, delegated or sublicensed by any Stockholder without the Company's prior written consent, and any attempt by any Stockholder to assign, transfer, delegate or sublicense any right, duty or obligation hereunder without such prior written consent of the Company shall be void. Subject to the foregoing and except as otherwise provided herein, the provisions hereof shall inure to the benefit of, and be binding upon, the respective successors, permitted assigns, heirs, executors and administrators of the parties hereto. Nothing herein, express or implied, is intended to confer upon any party other than the parties hereto or their respective successors, permitted assigns, heirs, executors and administrators any rights, duties or obligations under or by reason of this Agreement, except as expressly provided herein.

8.2 Governing Law; Venue; Jury Trial Waiver. This Agreement shall be governed by and construed in accordance with the internal laws of the State of Delaware without regard to conflict-of-law principles. Each party hereto hereby (i) irrevocably and unconditionally submits to the jurisdiction of the courts of the State of California located in Alameda County and of the United States of America for the Northern District of California for the purpose of any action, suit or proceeding based upon, arising out of or relating to this Agreement, (ii) agrees not to commence any action, suit or proceeding based upon, arising out of or relating to this Agreement except in the aforesaid courts, and (iii) irrevocably waives, and agrees not to assert, by way of motion, as a defense or otherwise, to the fullest extent permitted by law, in any such action, suit or proceeding, any claim that such party is not subject personally to the jurisdiction of the

aforesaid courts, that such party's property is exempt or immune from attachment or execution, that such action, suit or proceeding is brought in an inconvenient forum, that the venue of such action, suit or proceeding is improper or that this Agreement or the subject matter hereof may not be enforced in or by the aforesaid courts. EACH PARTY HERETO REPRESENTS AND WARRANTS THAT SUCH PARTY HAS REVIEWED THIS SECTION 8.2 WITH HIS/HER/ITS LEGAL COUNSEL AND THAT SUCH PARTY, FOLLOWING SUCH CONSULTATION WITH LEGAL COUNSEL, KNOWINGLY, VOLUNTARILY AND INTENTIONALLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY RIGHTS HE/SHE/IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY ACTION, SUIT OR PROCEEDING BASED UPON, ARISING OUT OF OR RELATING TO THIS AGREEMENT. THIS WAIVER IS A MATERIAL INDUCEMENT FOR THE PARTIES HERETO ENTERING INTO THIS AGREEMENT. THE SCOPE OF THIS WAIVER IS INTENDED TO BE ALL-ENCOMPASSING OF ANY AND ALL DISPUTES THAT MAY BE FILED IN ANY COURT AND THAT RELATE TO THE SUBJECT MATTER OF THIS TRANSACTION, INCLUDING CONTRACT CLAIMS, TORT CLAIMS (INCLUDING NEGLIGENCE), BREACH OF DUTY CLAIMS AND ALL OTHER COMMON LAW AND STATUTORY CLAIMS. THIS SECTION 8.2 HAS BEEN FULLY DISCUSSED BY EACH OF THE PARTIES HERETO, AND THE PROVISIONS OF THIS SECTION 8.2 WILL NOT BE SUBJECT TO ANY EXCEPTIONS.

8.3 Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall be deemed to be one and the same agreement. The exchange of copies hereof, including signature pages hereto, by facsimile, e-mail or other means of electronic transmission shall constitute effective execution and delivery hereof as to the parties and may be used in lieu of the original Agreement for all purposes. Signatures transmitted by facsimile, e-mail or other means of electronic transmission shall be deemed to be original signatures for all purposes.

8.4 Interpretation. Capitalized terms shall have the meanings as defined herein, and the meaning of defined terms shall be equally applicable to both the singular and plural forms of the terms defined. For purposes of this Agreement, (i) the words "include," "includes" and "including" shall be deemed to be followed by the words "without limitation," (ii) the word "or" is not exclusive, (iii) the words "herein," "hereof," "hereby," "hereto," "hereunder" and words of similar import refer to this Agreement as a whole, and (iv) with respect to the determination of any period of time, "from" means "from and including" and "to" means "to but excluding." Unless the context otherwise requires, references herein: (a) to a Section, a Schedule or an Exhibit mean a Section, a Schedule or an Exhibit of, or attached to, this Agreement; (b) to agreements, instruments and other documents shall be deemed to include all subsequent amendments, supplements and other modifications thereto; (c) to statutes or regulations are to be construed as including all statutory and regulatory provisions consolidating, amending or replacing the statute or regulation referred to; (d) to any Person includes such Person's successors and assigns, but, if applicable, only if such successors and assigns are not prohibited by this Agreement; and (e) to any gender includes each other gender. The Exhibits attached hereto shall be construed with, and as an integral part of, this Agreement to the same extent as if they were set forth verbatim herein. The titles, captions and headings herein are for convenience of reference only and shall not affect the meaning or interpretation hereof. This Agreement shall be construed without regard to any presumption or rule requiring construction or interpretation against the party drafting an instrument or causing any instrument to be drafted.

8.5 Notices. Except as may be otherwise provided herein, all notices, requests, consents, claims, demands, waivers and other communications required or permitted hereunder shall be in writing and shall be deemed given or delivered (i) when delivered personally, (ii) one business day after being deposited with an overnight courier service (costs prepaid), (iii) when sent by facsimile or e-mail if sent during the recipient's normal business hours and on the next business day if sent after the recipient's normal business hours, in each case with confirmation of transmission by the transmitting equipment, or (iv) when received or rejected by the addressee, if sent by certified or registered mail, return receipt requested, postage prepaid, in each case to the addresses, facsimile numbers and e-mail addresses and marked to the attention of the person (by name or title) designated on Schedule 1 or Schedule 2 attached hereto (or to such address, facsimile number and e-mail address and marked to the attention of the person (by name or title)

(a) indicated in the Company's records, in the case of any other holder of capital stock of the Company, and (b) on the signature page(s) hereto, in the case of the Company) or to such other address, facsimile number, e-mail address or person as such party may designate by a notice delivered to the other parties hereto. In addition, all notices, requests, consents, claims, demands, waivers and other communications given or delivered to the Company shall include a mandatory copy (which shall not constitute notice) to Latham & Watkins LLP, 140 Scott Drive, Menlo Park, CA 94025, Attn: Alan Mendelson and Ben Potter, Facsimile (650-463-2600), E-mail (alan.mendelson@lw.com and benjamin.potter@lw.com) (or such other Person as the Company may designate by a notice delivered to the other parties hereto).

8.6 Attorneys' Fees. If any action, suit or proceeding is necessary to enforce or interpret the terms of this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees, costs and necessary disbursements in addition to any other relief to which such party may be entitled.

8.7 Amendments and Waivers; Termination. In addition to automatic termination of specific rights and restrictions as provided in Section 2.14, Section 4.3, and Section 7.8, this Agreement may be amended, modified, terminated or supplemented and the observance of any provision hereof may be waived (either generally or in a particular instance, and either retroactively or prospectively) by a writing signed by (i) the Company, (ii) the holders of a majority of the Registrable Securities then outstanding (the "**Requisite Investors**") and (iii) the Key Holders holding a majority of the shares of capital stock of the Company held by all of the Key Holders who are then providing services to the Company as directors, officers, employees or consultants (the "**Requisite Key Holders**"); provided, however, that the Company may, in its sole discretion, waive compliance with Section 2.12(c) (and the Company's failure to object promptly in writing after receiving written notification of a proposed assignment allegedly in violation of Section 2.12(c) shall be deemed to be a waiver); provided, further, that, notwithstanding anything to the contrary in this Section 8.7, any provision hereof may be waived by a party, on such party's own behalf, without the consent of any other party. Any amendment, modification, termination, supplement or waiver effected in accordance with this Section 8.7 shall be binding on all parties hereto and all of their respective successors, permitted assigns, heirs, executors and administrators whether or not such party, successor, permitted assignee, heir, executor or

administrator entered into or approved such amendment, modification, termination, supplement or waiver. Each Key Holder and each Investor acknowledges that, by operation of this Section 8.7, the Requisite Key Holders and the Requisite Investors will have the right and power to diminish or eliminate all rights of such Key Holder or Investor, as applicable, hereunder. No waivers of, or exceptions to, any term, condition or provision hereof, in any one or more instances, shall be deemed to be, or construed as, a further or continuing waiver of, or exception to, any such term, condition or provision. Notwithstanding the foregoing:

(a) **Schedule 1** and **Schedule 2** attached hereto may be amended by the Company from time to time in accordance with Section 8.13 to add information regarding additional Investors or Key Holders, as applicable, without the consent of the other parties hereto;

(b) the consent of the Key Holders shall not be required for any amendment, modification, termination, supplement or waiver of any provision hereof if such amendment, modification, termination, supplement or waiver is not directly applicable to the rights of the Key Holders hereunder;

(c) Section 6.1(a), this Section 8.7(c) and Section 8.20 shall not be amended, modified, terminated, supplemented or waived without the written consent of Pfizer, for so long as Pfizer and its Affiliates (as defined below) continue to own beneficially a majority of the shares of Series A-1 Preferred Stock originally issued pursuant to the Series A-1 Purchase Agreement; provided that such sections may be amended in connection with a bona fide preferred stock equity financing pursuant to which this Agreement is amended and restated but such provisions are not otherwise substantially modified;

(d) Section 6.1(b) and this Section 8.7(d) shall not be amended, modified, terminated, supplemented or waived without the written consent of the holders of a majority of the outstanding shares of Series B Preferred Stock, for so long as at least 916,380 shares of Series B Preferred Stock remain issued and outstanding;

(e) Section 6.1(c) and this Section 8.7(e) shall not be amended, modified, terminated, supplemented or waived without the written consent of the holders of a majority of the outstanding shares of Series C Preferred Stock, for so long as at least 777,778 shares of Series C Preferred Stock remain issued and outstanding;

(f) Section 6.1(d) shall not be amended, modified, terminated, supplemented or waived without the written consent of the holders of a majority of the outstanding shares of Common Stock (other than (i) any Common Stock issued or issuable upon conversion of the Preferred Stock or (ii) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right or other security that is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, the shares referenced in clause (i) above); and

(g) Any amendment, modification, termination or waiver of Subsection 7.3 that (i) materially increases the obligations of any Investor under this Agreement, or (ii) materially adversely affects the rights of any Investor, shall require the consent of such Investor; provided, however, that in no circumstances shall this Subsection 8.7(g) be interpreted in such a manner to, except as otherwise provided for herein, require the consent of any Investor to (i) the termination

of this Agreement in accordance with this Section 8.7, (ii) the termination of Section 7 in its entirety in accordance with Section 7.8 hereof or this Section 8.7, or (iii) any amendment or modification of Subsection 7.3 in connection with a bona fide equity financing pursuant to which this Agreement is amended and/or restated but such provisions are not amended or modified in a manner that is materially adverse to such Investor.

8.8 Severability. Should any provision contained herein be held as invalid, illegal or unenforceable, such holding shall not affect the validity of the remainder of this Agreement, the balance of which shall continue to be binding upon the parties with any such modification to become a part hereof and treated as though originally set forth herein.

8.9 Delays or Omissions. Except as otherwise provided herein, no delay or omission to exercise any right, power or remedy accruing to any party hereunder upon any breach or default of any other party hereunder shall impair any such right, power or remedy of such non-breaching or non-defaulting party nor shall it be construed to be a waiver of any such breach or default, or an acquiescence therein, or of (or in) any similar breach or default thereafter occurring; nor shall any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. Subject to Section 8.5 and Section 8.7, any waiver, permit, consent or approval, of any kind or character on the part of any party, of any breach or default hereunder (or any waiver on the part of any party of any provisions or conditions hereof) must be in writing and shall be effective only to the extent specifically set forth in such writing. All remedies, either hereunder or by law or otherwise afforded to any party, shall be cumulative and not alternative.

8.10 Entire Agreement. This Agreement (including the Schedule(s) and Exhibit(s) attached hereto) constitutes the full and entire understanding and agreement of the parties hereto with respect to the subject matter contained herein and supersedes any and all other communications, representations, agreements, understandings and letters of intent, whether written or oral, between or among any of the parties hereto with respect to the subject matter contained herein.

8.11 Further Assurances. Each party hereto agrees to cooperate fully with the other parties hereto and to execute and deliver, or cause to be executed and delivered, such further agreements, instruments and documents and to give such further written assurance and take such further acts as may be reasonably requested by any other party hereto to evidence and reflect the transactions contemplated by this Agreement and to carry into effect the intents and purposes of this Agreement.

8.12 Adjustments for Stock Splits, Etc. All references herein to numbers of shares shall automatically be proportionally adjusted to reflect any stock combination, stock split, stock dividend, recapitalization or other similar transaction affecting the capital stock of the Company occurring after the date of this Agreement.

8.13 Additional Parties.

(a) If the Company issues additional shares of Preferred Stock after the date hereof, the Company shall, as a condition to the issuance of such shares, require the purchaser of such shares to become a party to this Agreement by executing and delivering to the Company (i) the Adoption Agreement, in substantially the form attached hereto as **Exhibit A** (the “**Adoption Agreement**”), or (ii) a counterpart signature page hereto agreeing to be bound by, and subject to, the terms hereof as an Investor and Stockholder hereunder. In either event, each such Person shall thereafter be deemed an Investor and a Stockholder for all purposes hereunder.

(b) If the Company issues additional shares of Common Stock after the date hereof representing 1% or more of the Company’s fully-diluted capitalization, the Company shall, as a condition to the issuance of such shares, require the purchaser or recipient of such shares to become a party to this Agreement by executing and delivering to the Company (i) the Adoption Agreement, or (ii) a counterpart signature page hereto agreeing to be bound by, and subject to, the terms hereof as a Key Holder and Stockholder hereunder. In either event, each such Person shall thereafter be deemed a Key Holder and a Stockholder for all purposes hereunder.

8.14 Transfers. Each transferee or assignee of any shares of capital stock of the Company subject hereto shall continue to be bound by, and subject to, the terms and conditions hereof, and, as a condition precedent to any such transfer or assignment of shares, each such transferee or assignee shall agree in writing to be bound by, and subject to, all of the terms and conditions hereof by executing the Adoption Agreement and delivering it to the Company. Upon the execution of the Adoption Agreement (and delivery thereof to the Company) by any transferee or assignee of any shares of capital stock of the Company subject hereto, such transferee or assignee shall be deemed to be (i) a party hereto as if such transferee or assignee were the transferor or assignor and such transferee’s or assignee’s signature appeared on the signature pages of this Agreement and (ii) an Investor and a Stockholder, or a Key Holder and a Stockholder, as applicable. The Company shall not permit the transfer, on its books, of any shares of capital stock of the Company subject hereto or issue a new certificate representing any such shares unless and until such transferee or assignee shall have complied with the terms of this Section 8.14.

8.15 Aggregation of Stock. All shares of capital stock of the Company held or acquired by a Stockholder and/or its Affiliates shall be aggregated together for the purpose of determining the availability of any rights hereunder, and such Affiliated Persons may apportion such rights as among themselves in any manner they deem appropriate. For purposes of determining the number of shares of Registrable Securities held by a transferee, the holdings of a transferee that is (x) an Affiliate or stockholder of a Holder, (y) a Holder’s Immediate Family Member, or (z) a trust for the benefit of an individual Holder (or one or more of his or her Immediate Family Members) shall be aggregated together and with those of such transferring Holder; provided, however, that all transferees who would not qualify individually for assignment of rights shall have a single attorney-in-fact for the purpose of exercising any rights, receiving notices or taking any action under this Agreement. Notwithstanding anything to the contrary, the shares held by JANUS HENDERSON GLOBAL LIFE SCIENCES FUND or JANUS HENDERSON CAPITAL FUNDS PLC on behalf of its series, JANUS HENDERSON GLOBAL LIFE SCIENCES FUND will be aggregated solely for the purpose of determining whether either JANUS HENDERSON GLOBAL LIFE SCIENCES FUND or JANUS HENDERSON CAPITAL FUNDS PLC on behalf of its series, JANUS HENDERSON GLOBAL LIFE SCIENCES FUND (or their respective transferees) is a “Major Investor” under this Agreement.

8.16 Calculations. All calculations hereunder, including calculations of pro rata shares, shall be made by the Company and shall be binding upon the parties hereto absent fraud or manifest error. No fractional shares shall be Transferred hereunder.

8.17 Conflict. In the event of any conflict between this Agreement and the Restated Charter or the Company's Bylaws, the terms of the Restated Charter or the Company's Bylaws, as the case may be, shall control. In the event of any conflict between this Agreement (or any notice delivered hereunder) and the Company's books and records, the Company's books and records shall control absent fraud or manifest error.

8.18 Spousal Consent. If any individual Stockholder is married on the date of this Agreement or the date such Stockholder becomes a party to this Agreement pursuant to Section 8.13 or Section 8.14, such Stockholder's spouse shall, concurrently with the execution of this Agreement by such Stockholder, execute and deliver to the Company a spousal consent in substantially the form of **Exhibit B** attached hereto ("**Spousal Consent**"). Notwithstanding the execution and delivery thereof, such Spousal Consent shall not be deemed to confer or convey to such Stockholder's spouse any rights in such Stockholder's shares of capital stock of the Company that do not otherwise exist by operation of law or the agreement of the parties. If any individual Stockholder marries (or remarries) after the date of this Agreement or the date such Stockholder becomes a party to this Agreement pursuant to Section 8.13 or Section 8.14, such Stockholder shall, within 30 days thereafter, obtain his or her new spouse's acknowledgement of, and consent to, the existence and binding effect of all restrictions contained in this Agreement by causing such spouse to execute and deliver a Spousal Consent.

8.19 Prior Agreement Superseded. Pursuant to Section 8.7 of the Prior Agreement, the undersigned parties who are parties to the Prior Agreement hereby amend and restate the Prior Agreement to read in its entirety as set forth in this Agreement, such that the Prior Agreement shall be of no further force or effect and is hereby entirely replaced and superseded by this Agreement.

8.20 Other Business Activities of Investors. The Company acknowledges that the Investors, and each of their respective Affiliates are in the business of investing and therefore review the business plans and related proprietary information of many enterprises, including enterprises that may have products or services that compete directly or indirectly with those of the Company. Nothing in this Agreement or any other agreement related to the transactions contemplated by this Agreement (collectively, the "**Transaction Agreements**") shall preclude or in any way restrict the Investors from investing or participating in any particular enterprise, whether or not such enterprise has products or services that compete with those of the Company. Further, the Company, each Investor and each Key Holder acknowledge and agree that (i) the Investors, and each of their respective Affiliates may presently have, or may engage in the future in, internal development programs, or may receive information from third parties that relates to, and may develop and commercialize products independently or in cooperation with such third parties, that are similar to or that are directly or indirectly competitive with, the Company's development programs, products or services, and (ii) any employee of any Investor, or any of their respective Affiliates serving on the Board or as an observer thereon is serving in such capacity at the request, and for the benefit, of the Company. Accordingly, the Investors', or any of their respective Affiliate's designation of any individual to the Board or as an observer to the Board, the service of such individual on the Board or as an observer thereon on behalf of

any Investor, or the exercise by any Investor or any of their respective Affiliates of any rights under this Agreement or any of the Transaction Agreements, shall not in any way preclude or restrict any Investor or their respective Affiliates from conducting any development program, commercializing any product or service or otherwise engaging in any enterprise, whether or not such development program, product, service or enterprise competes with those of the Company, so long as such activities do not result in a violation of applicable law, the confidentiality provisions of this Agreement, any other Transaction Agreement, or any other agreement between the Company, on the one hand, and such Investor or any of their respective Affiliates, on the other hand. Nothing herein or in any other Transaction Agreement shall be construed to impose on any Investor or any of their respective Affiliates or any their respective Board Designees or observers any restriction, duty or obligation other than as expressly set forth herein or therein.

[signature pages follow]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

4D MOLECULAR THERAPEUTICS, INC.

By: /s/ David Kim

Name: David Kim

Title: Chief Executive Officer

Address:

5858 Horton Street

Suite 455

Emeryville, CA 94608

Attention: Chief Executive Officer

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

**VIKING GLOBAL OPPORTUNITIES ILLIQUID
INVESTMENTS SUB-MASTER LP**

By: Viking Global Opportunities Portfolio GP LLC, its
general partner

By: /s/ Matthew Bloom

Name: Matthew Bloom

Title: Authorized Signatory

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

PFIZER VENTURES (US) LLC

By: /s/ Barbara Dalton

Name: Barbara Dalton

Title: President

PFIZER INC.

By: /s/ Barbara Dalton

Name: Barbara Dalton

Title: President

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

RIDGEBACK CAPITAL INVESTMENTS LP

By: Ridgeback Capital Management LP; its Investment
Manager

By: /s/ Christian Sheldon

Name: Christian Sheldon

Title: CTO

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

A.M. PAPPAS LIFE SCIENCE VENTURES V, LP

By: AMP&A Management V, LLC, its General Partner

By: /s/ Arthur M. Pappas

Name: Arthur M. Pappas

Title: CEO & Managing Partner, Pappas Capital, LLC

PV V CEO FUND, LP

By: AMP&A Management V, LLC, its General Partner

By: /s/ Arthur M. Pappas

Name: Arthur M. Pappas

Title: CEO & Managing Partner, Pappas Capital, LLC

CHIESI VENTURES, LP

By: Chiesi Ventures, Inc., its General Partner

By: Pappas Capital, LLC, its Management Company

By: /s/ Arthur M. Pappas

Name: Arthur M. Pappas

Title: CEO & Managing Partner, Pappas Capital, LLC

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

BERKELEY CATALYST FUND I LP

By: BCF I LLC
Its: General Partner

By: Berkeley Catalyst Fund Management LLC
Its: General Partner

By: /s/ Laura A. Smoliar
Name: Laura A. Smoliar
Title: Managing Member

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

PERCEPTIVE LIFE SCIENCES MASTER FUND LTD

51 Astor Place, 10th Floor
New York, NY 10003

By: /s/ James H Mannix

Name: James H Mannix

Title: Chief Operating Officer

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

BIOTECHNOLOGY VALUE FUND, L.P.

By: /s/ Mark Lampert
Name: Mark Lampert
Title: Chief Executive Officer BVF I GP LLC, itself General Partner of Biotechnology Value Fund, L.P.

BIOTECHNOLOGY VALUE FUND II, LP

By: /s/ Mark Lampert
Name: Mark Lampert
Title: Chief Executive Officer BVF II GP LLC, itself General Partner of Biotechnology Value Fund II, L.P.

BIOTECHNOLOGY VALUE TRADING FUND OS, L.P.

By: /s/ Mark Lampert
Name: Mark Lampert
Title: President BVF Inc., General Partner of BVF Partners L.P., itself sole member of BVF Partners OS Ltd., itself GP of Biotechnology Value Trading Fund OS, L.P.

INVESTMENT 10, L.L.C.

By: /s/ Mark Lampert
Name: Mark Lampert
Title: President BVF Inc., General Partner of BVF Partners L.P., itself attorney-in-fact for Investment 10, L.L.C.

MSI BVF SPV, L.L.C. c/o Magnitude Capital B

By: /s/ Mark Lampert
Name: Mark Lampert
Title: President BVF Inc., itself General Partner of BVF Partners L.P., itself attorney-in-fact for MSI BVF SPV, L.L.C.

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

MERIDIAN SMALL CAP GROWTH FUND

By: its Investment Adviser
ArrowMark Colorado Holdings, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

ARROWMARK LIFE SCIENCE FUND, LP

By: its General Partner
AMP Life Science GP, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

**ARROWMARK FUNDAMENTAL OPPORTUNITY
FUND, L.P.**

By: its General Partner
ArrowMark Partners GP, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

LOOKFAR INVESTMENTS, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

CF ASCENT LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

THB IRON ROSE LLC

By: its Investment Adviser
ArrowMark Colorado Holdings, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

IRON HORSE INVESTMENT, LLC

By: its Investment Adviser
ArrowMark Colorado Holdings, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

THB IRON ROSE LLC, LIFE SCIENCE PORTFOLIO

By: its Investment Adviser
ArrowMark Colorado Holdings, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

CYSTIC FIBROSIS FOUNDATION

By: /s/ /s/ Michael P. Boyle

Name: Michael P. Boyle, M.D.

Title: President and CEO

By: /s/ Chris Gegelys

Name: Chris Gegelys

Title: SVP & Chief Legal Officer

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

CASDIN PARTNERS MASTER FUND, L.P.

By: Casdin Partners GP, LLC, its General Partner

By: /s/ Eli Casdin

Name: Eli Casdin

Title: Managing Member

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

LONGEVITY VISION FUND I LP

By: Longevity Vision Fund I GP, LLC, its General Partner

By: /s/ Dmitry Vorontsov

Name: Dmitry Vorontsov

Title: Director

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

NH INVESTMENT & SECURITIES CO., LTD.

acting in its capacity as trustee for
QUAD Healthcare Multi-Strategy 5 Fund

By: /s/ Jeong Young-Chae

Name: Jeong Young-Chae

Title: Chief Executive Officer

Address:

Yeoui-daero 60, Yeongdeungpo-gu
Seoul 07325, Korea

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

SAMSUNG SECURITIES CO., LTD.

acting in its capacity as trustee for
QUAD Healthcare Multi-Strategy 8 Fund

By: /s/ Chang Seok Hoon

Name: Chang Seok Hoon

Title: President & CEO

Address:

Secho-daero 74 Gil 11, Seocho-gu

Seoul 06620, Korea

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

OCTAGON INVESTMENTS MASTER FUND LP

By: Octagon Capital Advisors LP,
its Investment Manager

By: /s/ Ting Jia

Name: Ting Jia

Title: Managing Member

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

AMZAK HEALTH INVESTORS, LLC

By: /s/ Joyce Erony

Name: Joyce Erony

Title: Managing Director

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

MIRAE ASSET SECURITIES (HK) LIMITED

By: /s/ Sang Joon Kim

Name: Sang Joon Kim

Title: CEO

**MIRAE ASSET GROWTH 4DMT
INVESTMENT COMPANY LIMITED**

By: /s/ Sungwon Song

Name: Sungwon Song

Title: Alternate Director

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

KEY HOLDER:

By: /s/ David Kim

Name: David Kim

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

KEY HOLDER:

By: /s/ Theresa Janke

Name: Theresa Janke

[Signature Page to Third A&R Investors' Rights Agreement]

IN WITNESS WHEREOF, the parties have executed this Third Amended and Restated Investors' Rights Agreement as of the date first written above.

KEY HOLDER:

By: /s/ Melissa Kotterman

Name: Melissa Kotterman

[Signature Page to Third A&R Investors' Rights Agreement]

SCHEDULE 1

SCHEDULE OF INVESTORS

VIKING GLOBAL OPPORTUNITIES ILLIQUID INVESTMENTS SUB-MASTER LP

c/o Viking Global Investors LP
55 Railroad Avenue
Greenwich, CT 06830
Attention: General Counsel
E-mail: legalnotices@vikingglobal.com

JANUS HENDERSON GLOBAL LIFE SCIENCES FUND

c/o Janus Capital Management LLC
151 Detroit Street
Denver, CO 80206
Email: VCPPIPE@janus.com

JANUS HENDERSON CAPITAL FUNDS PLC

c/o Janus Capital Management LLC
151 Detroit Street
Denver, CO 80206
Email: VCPPIPE@janus.com

BIOTECHNOLOGY VALUE FUND, L.P.

44 Montgomery Street 40th Floor
San Francisco, CA 94104
Attention: James Kratky
Email: kratky@bvflp.com

with a copy (which shall not constitute notice) to:

Ryan A. Murr
Gibson, Dunn & Crutcher LLP
555 Mission Street
San Francisco, CA 94105-0921
rmurr@gibsondunn.com

BIOTECHNOLOGY VALUE FUND II, LP

44 Montgomery Street 40th Floor
San Francisco, CA 94104
Attention: James Kratky
Email: kratky@bvflp.com

with a copy (which shall not constitute notice) to:

Ryan A. Murr
Gibson, Dunn & Crutcher LLP
555 Mission Street
San Francisco, CA 94105-0921
rmurr@gibsondunn.com

BIOTECHNOLOGY VALUE TRADING FUND OS, L.P.

PO Box 309 Ugland House,
Grand Cayman, KY1- 1104, Cayman Islands
Attention: James Kratky
Email: kratky@bvflp.com

with a copy (which shall not constitute notice) to:

Ryan A. Murr
Gibson, Dunn & Crutcher LLP
555 Mission Street
San Francisco, CA 94105-0921
rmurr@gibsondunn.com

INVESTMENT 10, L.L.C.

Address: 900 N Michigan Ave, Suite 1100 Chicago, IL 60611
Attention: James Kratky
Email: kratky@bvflp.com

with a copy (which shall not constitute notice) to:

Ryan A. Murr
Gibson, Dunn & Crutcher LLP
555 Mission Street
San Francisco, CA 94105-0921
rmurr@gibsondunn.com

MSI BVF SPV, L.L.C. c/o Magnitude Capital

200 Park Avenue, 56th Floor
New York, NY 10166
Attention: James Kratky
Email: kratky@bvflp.com

with a copy (which shall not constitute notice) to:

Ryan A. Murr
Gibson, Dunn & Crutcher LLP
555 Mission Street
San Francisco, CA 94105-0921
rmurr@gibsondunn.com

MERIDIAN SMALL CAP GROWTH FUND

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

ARROWMARK LIFE SCIENCE FUND, LP

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

ARROWMARK FUNDAMENTAL OPPORTUNITY FUND, L.P.

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

LOOKFAR INVESTMENTS, LLC

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

CF ASCENT LLC

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

THB IRON ROSE LLC

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

IRON HORSE INVESTMENTS, LLC

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

THB IRON ROSE LLC, LIFE SCIENCE PORTFOLIO

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

TONY YAO

c/o ArrowMark Colorado Holdings, LLC
100 Fillmore Street, Suite 325
Denver, CO 80206
Attn: Rick Grove
Email: rgrove@arrowmarkpartners.com

A.M. PAPPAS LIFE SCIENCE VENTURES V, LP

c/o Pappas Capital, LLC
2520 Meridian Parkway, Suite 400
Durham, NC 27713
Attn: Ford S. Worthy
Fax: 919-998-3301
Email: fworthy@pappasventures.com

PV V CEO FUND, LP

c/o Pappas Capital, LLC
2520 Meridian Parkway, Suite 400
Durham, NC 27713
Attn: Ford S. Worthy
Fax: 919-998-3301
Email: fworthy@pappasventures.com

CHIESI VENTURES, LP

c/o Pappas Capital, LLC
2520 Meridian Parkway, Suite 400
Durham, NC 27713
Attn: Ford S. Worthy
Fax: 919-998-3301
Email: fworthy@pappasventures.com

PFIZER INC.

230 East Grand
South San Francisco, CA 94080
Attention: Margi McLoughlin
Facsimile: 860-715-9727
Email: margi.mcLoughlin@pfizer.com

With a copy to:

Pfizer Inc.
235 E. 42nd Street
New York, NY 10017
Attention: Andrew J. Muratore, Esq.
Facsimile: 646-348-8162
Email: andrew.j.muratore@pfizer.com

PERCEPTIVE LIFE SCIENCES MASTER FUND LTD

51 Astor Place 10th floor
New York NY 10003
Attention: Steve Berger
Email: Steve@perceptivelife.com

RIDGEBACK CAPITAL INVESTMENTS LP

75 Ninth Avenue, 5th Floor
New York, NY 10011
Attention: Christopher A. Nonas
Email: nonas@ridgebackcap.com

CUREDUCHENNE VENTURES

1400 Quail St. #110,
Newport Beach, CA 92660
Attention: Debra Miller
Facsimile: 949-872-2568
Email: debra@cureduchenne.org
Phone: 949-872-2552

BERKELEY CATALYST FUND I LP

19925 Stevens Creek Blvd., Suite 100
Cupertino, CA 95014
Attention: Laura Smoliar
Email: Laura@BerkeleyCatalystFund.com
Phone: (628) 400-3052)

C.P. PHARMACEUTICALS INTERNATIONAL C.V.

c/o its General Partners,
Pfizer Manufacturing LLC and Pfizer
Production LLC
235 East 42nd Street
New York, NY 10017
United States of America
Attention: Senior Vice President and
Associate General Counsel
Pfizer Legal Division
Business Transactions Group
Facsimile: 646-563-9611

With a copy to:
Pfizer Inc.
230 East Grand
South San Francisco, CA 94080
Attention: Margi McLoughlin
Facsimile: 860-715-9727
Email: margi.mcLoughlin@pfizer.com

Pfizer Inc.
235 E. 42nd Street
New York, NY 10017
Attention: Andrew J. Muratore, Esq.
Facsimile: 646-348-8162
Email: andrew.j.muratore@pfizer.com

CHM VENTURE I, LLC

PO Box 5331
Johnson City, TN 37602-5331
Attn: Randy Wheelock
Facsimile: 423-282-0429
E-mail: randy@generabio.com

REPLEON, LLC

Attn: Greg A. Betterton, P.A. 735 E. Venice Avenue, Ste 200
Venice, FL 34285
Fax: 941-483-4992
Email: greg@bettertonlaw.com

MIRAEASSET-CELLTRION NEW GROWTH FUND I

2F, GlassTower Bldg, 534, Teheran-ro, Gangnam-gu, Seoul, 06181, Korea
Attention: SungWon Song
Facsimile: +82-2-2051-5853
Email: SungWon.Song@miraeasset.com

MIRAEASSET CAPITAL CO., LTD

2F, GlassTower Bldg, 534, Teheran-ro, Gangnam-gu, Seoul, 06181, Korea
Attention: SungWon Song
Facsimile: +82-2-2051-5853
Email: SungWon.Song@miraeasset.com

MIRAEASSET-NAVER NEW GROWTH FUND I

2F, GlassTower Bldg, 534, Teheran-ro, Gangnam-gu, Seoul, 06181, Korea
Attention: SungWon Song
Facsimile: +82-2-2051-5853
Email: SungWon.Song@miraeasset.com

MIRAE ASSET HI-TECH FRONTIER INVESTMENT FUND

Mirae Asset Venture Tower
B1F20, Pangyoyeok-ro 241 beongil, Bundang-gu, Seongnam-si, Gyeonggi-do,
13494, Republic of Korea
Attention: Gil Tae, Wie
Facsimile: 82-2-6205-2680
Email: gtwie@miraeasset.com

MIRAE ASSET GOOD COMPANY SECONDARY FUND #18-1

Mirae Asset Venture Tower
B1F20, Pangyoyeok-ro 241 beongil, Bundang-gu, Seongnam-si, Gyeonggi-do,
13494, Republic of Korea
Attention: Gil Tae, Wie
Facsimile: 82-2-6205-2680
Email: gtwie@miraeasset.com

MIRAEASSET VENTURE INVESTMENT, CO, LTD

Mirae Asset Venture Tower
B1F20, Pangyoyeok-ro 241 beongil, Bundang-gu, Seongnam-si, Gyeonggi-do,
13494, Republic of Korea
Attention: Gil Tae, Wie
Facsimile: 82-2-6205-2680
Email: gtwie@miraeasset.com

CYSTIC FIBROSIS FOUNDATION

CASDIN PARTNERS MASTER FUND, L.P.

1350 Avenue of the Americas, Suite 2600
New York, NY 10019
Email: FundAcct@casdinCapital.com

LONGEVITY VISION FUND I LP

555 Madison Avenue, 5th Floor
New York, NY 10022
With a mandatory copy (essential to constitute a valid notice) to: notices@lvf.vc

NH INVESTMENT & SECURITIES CO., LTD.

c/o QUAD HEALTHCARE MULTI-STRATEGY 5 FUND
c/o QUAD Investment Management
Address: 29/F, Three IFC, 10 Gukjegeumyung-ro, Yeongdeungpo-gu, Seoul, 07326, Korea
Attention: Sunwoo Kim
Email: sw.kim2@quadim.com

SAMSUNG SECURITIES CO., LTD.

c/o QUAD HEALTHCARE MULTI-STRATEGY 8 FUND
c/o QUAD Investment Management
Address: 29/F, Three IFC, 10 Gukjegeumyung-ro, Yeongdeungpo-gu, Seoul, 07326, Korea
Attention: Sunwoo Kim
Email: sw.kim2@quadim.com

OCTAGON INVESTMENTS MASTER FUND LP

c/o Octagon Capital Advisors LP
Address: 654 Madison Avenue, 16th Floor, New York, NY 10065
Attention: Justin Hirsch
Email: justin.hirsch@octagoninvest.com

AMZAK HEALTH INVESTORS, LLC

Address: 295 Madison Avenue, 32nd Floor, New York, NY 10017
Attention: Joyce Erony and Scott Weiner
Email: joyce@majalincapital.com;
scott@majalincapital.com

SCHEDULE 2

KEY HOLDERS

David Kirn

[***]

Schaffer-Hinh Family Trust

[***]

Theresa Janke

[***]

Melissa Kotterman

[***]

EXHIBIT A

ADOPTION AGREEMENT

This Adoption Agreement (“**Adoption Agreement**”) is executed on _____, 20____, by the undersigned (the “**Holder**”) pursuant to the terms of that certain Third Amended and Restated Investors’ Rights Agreement dated as of April 29, 2020 (the “**Agreement**”), by and among the Company and certain of its Stockholders, as such Agreement may be amended or amended and restated hereafter. Capitalized terms used but not defined in this Adoption Agreement shall have the respective meanings ascribed to such terms in the Agreement. By the execution of this Adoption Agreement, the Holder agrees as follows.

1.1 **Acknowledgement.** Holder acknowledges that Holder is acquiring certain shares of the capital stock of the Company (the “**Stock**”), for one of the following reasons (Check the correct box):

- As a transferee of Shares from a party in such party’s capacity as an “Investor” bound by the Agreement, and after such transfer, Holder shall be considered an “Investor” and a “Stockholder” for all purposes of the Agreement.
- As a transferee of Shares from a party in such party’s capacity as a “Key Holder” bound by the Agreement, and after such transfer, Holder shall be considered a “Key Holder” and a “Stockholder” for all purposes of the Agreement.
- As a new Investor in accordance with Subsection 8.13(a) of the Agreement, in which case Holder will be an “Investor” and a “Stockholder” for all purposes of the Agreement.
- In accordance with Subsection 8.13(b) of the Agreement, as a new party who is not a new Investor, in which case Holder will be a “Stockholder” for all purposes of the Agreement.

1.2 **Agreement.** Holder hereby (a) agrees that the Stock, and any other shares of capital stock or securities required by the Agreement to be bound thereby, shall be bound by and subject to the terms of the Agreement and (b) adopts the Agreement with the same force and effect as if Holder were originally a party thereto.

1.3 **Notice.** Any notice required or permitted by the Agreement shall be given to Holder at the address or facsimile number listed below Holder’s signature hereto.

HOLDER: _____

By: _____
Name and Title of Signatory

Address: _____

Facsimile Number: _____

ACCEPTED AND AGREED:

4D MOLECULAR THERAPEUTICS, INC.

By: _____

Title: _____

EXHIBIT B

CONSENT OF SPOUSE

I, _____, spouse of _____, acknowledge that I have read that certain Third Amended and Restated Investors' Rights Agreement, dated as of April 29, 2020, by and among the Company and certain of its Stockholders (as defined therein), as may be amended from time to time, to which this Consent is attached as Exhibit B (the "**Agreement**"), and that I know the contents of the Agreement. I am aware that the Agreement contains provisions regarding the voting and transfer of shares of capital stock of the Company that my spouse may own, including any interest I might have therein.

I hereby agree that my interest, if any, in any shares of capital stock of the Company subject to the Agreement shall be irrevocably bound by the Agreement and further understand and agree that any community property interest I may have in such shares of capital stock of the Company shall be similarly bound by the Agreement.

I am aware that the legal, financial and related matters contained in the Agreement are complex and that I am free to seek independent professional guidance or counsel with respect to this Consent. I have either sought such guidance or counsel or determined after reviewing the Agreement carefully that I will waive such right.

Dated: _____

[Name of Key Holder's Spouse]

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LATHAM & WATKINS LLP

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December 7, 2020

4D Molecular Therapeutics, Inc.
 5858 Horton Street #455
 Emeryville, California 94608

Re: Registration Statement on Form S-1 (File No. 333-250150)
 Up to 5,476,189 Shares of Common Stock of 4D Molecular Therapeutics, Inc.

Ladies and Gentlemen:

We have acted as special counsel to 4D Molecular Therapeutics, Inc., a Delaware corporation (the "**Company**"), in connection with the proposed issuance of up to 5,476,189 shares of common stock, par value \$0.0001 per share (the "**Shares**"). The Shares are included in a registration statement on Form S-1 under the Securities Act of 1933, as amended (the "**Act**"), filed with the Securities and Exchange Commission (the "**Commission**") on December 4, 2020 (Registration No. 333-250150) (as amended, the "**Registration Statement**"). This opinion is being furnished in connection with the requirements of Item 601(b)(5) of Regulation S-K under the Act, and no opinion is expressed herein as to any matter pertaining to the contents of the Registration Statement or related prospectus (the "**Prospectus**"), other than as expressly stated herein with respect to the issue of the Shares.

As such counsel, we have examined such matters of fact and questions of law as we have considered appropriate for purposes of this letter. With your consent, we have relied upon certificates and other assurances of officers of the Company and others as to factual matters without having independently verified such factual matters. We are opining herein as to the General Corporation Law of the State of Delaware (the "**DGCL**"), and we express no opinion with respect to any other laws.

Subject to the foregoing and the other matters set forth herein, it is our opinion that, as of the date hereof, when the Shares shall have been duly registered on the books of the transfer agent and registrar therefor in the name or on behalf of the purchasers and have been issued by the Company against payment therefor (not less than par value) in the circumstances contemplated by the form of underwriting agreement most recently filed as an exhibit to the Registration Statement, the issue and sale of the Shares will have been duly authorized by all necessary corporate action of the Company, and the Shares will be validly issued, fully paid and nonassessable. In rendering the foregoing opinion, we have assumed that the Company will comply with all applicable notice requirements regarding uncertificated shares provided in the DGCL.

LATHAM & WATKINS LLP

This opinion is for your benefit in connection with the Registration Statement and may be relied upon by you and by persons entitled to rely upon it pursuant to the applicable provisions of the Act. We consent to your filing this opinion as an exhibit to the Registration Statement and to the reference to our firm in the Prospectus under the heading "Legal Matters." In giving such consent, we do not thereby admit that we are in the category of persons whose consent is required under Section 7 of the Act or the rules and regulations of the Commission thereunder.

Very truly yours,

/s/ Latham & Watkins LLP

4D MOLECULAR THERAPEUTICS, INC.
2020 INCENTIVE AWARD PLAN

ARTICLE I.
PURPOSE

The Plan's purpose is to enhance the Company's ability to attract, retain and motivate persons who make (or are expected to make) important contributions to the Company by providing these individuals with equity ownership opportunities.

ARTICLE II.
DEFINITIONS

As used in the Plan, the following words and phrases have the meanings specified below, unless the context clearly indicates otherwise:

2.1 "**Administrator**" means the Board or a Committee to the extent that the Board's powers or authority under the Plan have been delegated to such Committee. With reference to the Board's or a Committee's powers or authority under the Plan that have been delegated to one or more officers pursuant to Section 4.2, the term "Administrator" shall refer to such officer(s) unless and until such delegation has been revoked.

2.2 "**Applicable Law**" means any applicable law, including without limitation: (a) provisions of the Code, the Securities Act, the Exchange Act and any rules or regulations thereunder; (b) corporate, securities, tax or other laws, statutes, rules, requirements or regulations, whether federal, state, local or foreign; and (c) rules of any securities exchange or automated quotation system on which the Shares are listed, quoted or traded.

2.3 "**Award**" means an Option, Stock Appreciation Right, Restricted Stock award, Restricted Stock Unit award, Performance Bonus Award, Performance Stock Unit award, Dividend Equivalents award or Other Stock or Cash Based Award granted to a Participant under the Plan.

2.4 "**Award Agreement**" means an agreement evidencing an Award, which may be written or electronic, that contains such terms and conditions as the Administrator determines, consistent with and subject to the terms and conditions of the Plan.

2.5 "**Board**" means the Board of Directors of the Company.

2.6 "**Change in Control**" means any of the following:

(a) A transaction or series of transactions (other than an offering of Common Stock to the general public through a registration statement filed with the Securities and Exchange Commission) whereby any "person" or related "group" of "persons" (as such terms are used in Sections 13(d) and 14(d)(2) of the Exchange Act) directly or indirectly acquires beneficial ownership (within the meaning of Rules 13d-3 and 13d-5 under the Exchange Act) of the Company's securities possessing more than 50% of the total combined voting power of the Company's securities outstanding immediately after such acquisition; provided, however, that the following acquisitions shall not constitute a Change in Control: (i) any acquisition by the Company or any of its Subsidiaries; (ii) any acquisition by an employee benefit plan maintained by the Company or any of its Subsidiaries, (iii) any acquisition which complies with Sections 2.6(c)(i), 2.6(c)(ii) and 2.6(c)(iii); or (iv) in respect of an Award held by a particular Participant, any acquisition by the Participant or any group of persons including the Participant (or any entity controlled by the Participant or any group of persons including the Participant);

(b) The Incumbent Directors cease for any reason to constitute a majority of the Board;

(c) The consummation by the Company (whether directly involving the Company or indirectly involving the Company through one or more intermediaries) of (x) a merger, consolidation, reorganization, or business combination, (y) a sale or other disposition of all or substantially all of the Company's assets in any single transaction or series of related transactions or (z) the acquisition of assets or stock of another entity, in each case other than a transaction:

(i) which results in the Company's voting securities outstanding immediately before the transaction continuing to represent (either by remaining outstanding or by being converted into voting securities of the Company or the person that, as a result of the transaction, controls, directly or indirectly, the Company or owns, directly or indirectly, all or substantially all of the Company's assets or otherwise succeeds to the business of the Company (the Company or such person, the "**Successor Entity**") directly or indirectly, at least a majority of the combined voting power of the Successor Entity's outstanding voting securities immediately after the transaction;

(ii) after which no person or group beneficially owns voting securities representing 50% or more of the combined voting power of the Successor Entity; provided, however, that no person or group shall be treated for purposes of this Section 2.6(c)(ii) as beneficially owning 50% or more of the combined voting power of the Successor Entity solely as a result of the voting power held in the Company prior to the consummation of the transaction; and

(iii) after which at least a majority of the members of the board of directors (or the analogous governing body) of the Successor Entity were Board members at the time of the Board's approval of the execution of the initial agreement providing for such transaction; or

(d) The completion of a liquidation or dissolution of the Company.

Notwithstanding the foregoing, if a Change in Control constitutes a payment event with respect to any Award (or any portion of an Award) that provides for the deferral of compensation that is subject to Section 409A, to the extent required to avoid the imposition of additional taxes under Section 409A, the transaction or event described in subsection (a), (b), (c) or (d) of this Section 2.6 with respect to such Award (or portion thereof) shall only constitute a Change in Control for purposes of the payment timing of such Award if such transaction also constitutes a "change in control event," as defined in Treasury Regulation Section 1.409A-3(i)(5).

The Administrator shall have full and final authority, which shall be exercised in its sole discretion, to determine conclusively whether a Change in Control has occurred pursuant to the above definition, the date of such Change in Control and any incidental matters relating thereto; provided that any exercise of authority in conjunction with a determination of whether a Change in Control is a "change in control event" as defined in Treasury Regulation Section 1.409A-3(i)(5) shall be consistent with such regulation.

2.7 "**Code**" means the U.S. Internal Revenue Code of 1986, as amended, and all regulations, guidance, compliance programs and other interpretative authority issued thereunder.

2.8 "**Committee**" means one or more committees or subcommittees of the Board, which may include one or more Company directors or executive officers, to the extent permitted by Applicable Law.

To the extent required to comply with the provisions of Rule 16b-3, it is intended that each member of the Committee will be, at the time the Committee takes any action with respect to an Award that is subject to Rule 16b-3, a “non-employee director” within the meaning of Rule 16b-3; however, a Committee member’s failure to qualify as a “non-employee director” within the meaning of Rule 16b-3 will not invalidate any Award granted by the Committee that is otherwise validly granted under the Plan.

2.9 “**Common Stock**” means the common stock of the Company.

2.10 “**Company**” means 4D Molecular Therapeutics, Inc., a Delaware corporation, or any successor.

2.11 “**Consultant**” means any person, including any adviser, engaged by the Company or its parent or Subsidiary to render services to such entity if the consultant or adviser: (i) renders bona fide services to the Company; (ii) renders services not in connection with the offer or sale of securities in a capital-raising transaction and does not directly or indirectly promote or maintain a market for the Company’s securities; and (iii) is a natural person.

2.12 “**Designated Beneficiary**” means the beneficiary or beneficiaries the Participant designates, in a manner the Company determines, to receive amounts due or exercise the Participant’s rights if the Participant dies. Without a Participant’s effective designation, “Designated Beneficiary” will mean the Participant’s estate.

2.13 “**Director**” means a Board member.

2.14 “**Disability**” means a permanent and total disability under Section 22(e)(3) of the Code.

2.15 “**Dividend Equivalents**” means a right granted to a Participant to receive the equivalent value (in cash or Shares) of dividends paid on a specified number of Shares. Such Dividend Equivalent shall be converted to cash or additional Shares, or a combination of cash and Shares, by such formula and at such time and subject to such limitations as may be determined by the Administrator.

2.16 “**DRO**” means a “domestic relations order” as defined by the Code or Title I of the Employee Retirement Income Security Act of 1974, as amended, or the rules thereunder.

2.17 “**Effective Date**” has the meaning set forth in Section 11.3.

2.18 “**Employee**” means any employee of the Company or any of its Subsidiaries.

2.19 “**Equity Restructuring**” means a nonreciprocal transaction between the Company and its stockholders, such as a stock dividend, stock split (including a reverse stock split), spin-off or recapitalization through a large, nonrecurring cash dividend, that affects the number or kind of Shares (or other Company securities) or the share price of Common Stock (or other Company securities) and causes a change in the per share value of the Common Stock underlying outstanding Awards.

2.20 “**Exchange Act**” means the U.S. Securities Exchange Act of 1934, as amended, and all regulations, guidance and other interpretative authority issued thereunder.

2.21 “**Fair Market Value**” means, as of any date, the value of a Share determined as follows: (i) if the Common Stock is listed on any established stock exchange, the value of a Share will be the closing sales price for a Share as quoted on such exchange for such date, or if no sale occurred on such date, the last day preceding such date during which a sale occurred, as reported in *The Wall Street Journal*

or another source the Administrator deems reliable; (ii) if the Common Stock is not listed on an established stock exchange but is quoted on a national market or other quotation system, the value of a Share will be the closing sales price for a Share on such date, or if no sales occurred on such date, then on the last date preceding such date during which a sale occurred, as reported in The Wall Street Journal or another source the Administrator deems reliable; or (iii) if the Common Stock is not listed on any established stock exchange or quoted on a national market or other quotation system, the value established by the Administrator in its sole discretion. Notwithstanding the foregoing, with respect to any Award granted after the effectiveness of the Company's registration statement relating to its initial public offering and prior to the Public Trading Date, the Fair Market Value means the initial public offering price of a Share as set forth in the Company's final prospectus relating to its initial public offering filed with the Securities and Exchange Commission.

2.22 "**Greater Than 10% Stockholder**" means an individual then owning (within the meaning of Section 424(d) of the Code) more than 10% of the total combined voting power of all classes of stock of the Company or any parent corporation or subsidiary corporation of the Company, as determined in accordance with in Section 424(e) and (f) of the Code, respectively.

2.23 "**Incentive Stock Option**" means an Option that meets the requirements to qualify as an "incentive stock option" as defined in Section 422 of the Code.

2.24 "**Incumbent Directors**" means, for any period of 12 consecutive months, individuals who, at the beginning of such period, constitute the Board together with any new Director(s) (other than a Director designated by a person who shall have entered into an agreement with the Company to effect a transaction described in Section 2.6(a) or 2.6(c)) whose election or nomination for election to the Board was approved by a vote of at least a majority (either by a specific vote or by approval of the proxy statement of the Company in which such person is named as a nominee for Director without objection to such nomination) of the Directors then still in office who either were Directors at the beginning of the 12-month period or whose election or nomination for election was previously so approved. No individual initially elected or nominated as a director of the Company as a result of an actual or threatened election contest with respect to Directors or as a result of any other actual or threatened solicitation of proxies by or on behalf of any person other than the Board shall be an Incumbent Director.

2.25 "**Nonqualified Stock Option**" means an Option that is not an Incentive Stock Option.

2.26 "**Option**" means a right granted under Article VI to purchase a specified number of Shares at a specified price per Share during a specified time period. An Option may be either an Incentive Stock Option or a Nonqualified Stock Option.

2.27 "**Other Stock or Cash Based Awards**" means cash awards, awards of Shares, and other awards valued wholly or partially by referring to, or are otherwise based on, Shares or other property.

2.28 "**Overall Share Limit**" means the sum of (i) 1,618,961 Shares; (ii) any Shares that are reserved but unissued under the Prior Plan as of the Effective Date; (iii) any Shares that are subject to Prior Plan Awards that become available for issuance under the Plan pursuant to Article V; and (iv) an annual increase on the first day of each year beginning in 2021 and ending in 2030, equal to the lesser of (A) five percent of the Shares outstanding on the last day of the immediately preceding fiscal year and (B) such smaller number of Shares as determined by the Board.

2.29 "**Participant**" means a Service Provider who has been granted an Award.

2.30 "**Performance Bonus Award**" has the meaning set forth in Section 8.3.

2.31 "**Performance Stock Unit**" means a right granted to a Participant pursuant to Section 8.1 and subject to Section 8.2, to receive Shares, the payment of which is contingent upon achieving certain performance goals or other performance-based targets established by the Administrator.

2.32 "**Permitted Transferee**" means, with respect to a Participant, any "family member" of the Participant, as defined in the General Instructions to Form S-8 Registration Statement under the Securities Act (or any successor form thereto), or any other transferee specifically approved by the Administrator after taking into account Applicable Law.

2.33 "**Plan**" means this 2020 Incentive Award Plan.

2.34 "**Prior Plan**" means the Company's 2015 Equity Incentive Plan.

2.35 "**Prior Plan Award**" means an award outstanding under the Prior Plan as of the Effective Date.

2.36 "**Public Trading Date**" means the first date upon which Common Stock is listed (or approved for listing) upon notice of issuance on any securities exchange or designated (or approved for designation) upon notice of issuance as a national market security on an interdealer quotation system.

2.37 "**Restricted Stock**" means Shares awarded to a Participant under Article VII, subject to certain vesting conditions and other restrictions.

2.38 "**Restricted Stock Unit**" means an unfunded, unsecured right to receive, on the applicable settlement date, one Share or an amount in cash or other consideration determined by the Administrator to be of equal value as of such settlement date, subject to certain vesting conditions and other restrictions.

2.39 "**Rule 16b-3**" means Rule 16b-3 promulgated under the Exchange Act.

2.40 "**Section 409A**" means Section 409A of the Code.

2.41 "**Securities Act**" means the Securities Act of 1933, as amended, and all regulations, guidance and other interpretative authority issued thereunder.

2.42 "**Service Provider**" means an Employee, Consultant or Director.

2.43 "**Shares**" means shares of Common Stock.

2.44 "**Stock Appreciation Right**" or "**SAR**" means a right granted under Article VI to receive a payment equal to the excess of the Fair Market Value of a specified number of Shares on the date the right is exercised over the exercise price set forth in the applicable Award Agreement.

2.45 "**Subsidiary**" means any entity (other than the Company), whether domestic or foreign, in an unbroken chain of entities beginning with the Company if each of the entities other than the last entity in the unbroken chain beneficially owns, at the time of the determination, securities or interests representing at least 50% of the total combined voting power of all classes of securities or interests in one of the other entities in such chain.

2.46 "**Substitute Awards**" means Awards granted or Shares issued by the Company in assumption of, or in substitution or exchange for, awards previously granted, or the right or obligation to make future awards, in each case by a company or other entity acquired by the Company or any Subsidiary or with which the Company or any Subsidiary combines.

2.47 “**Termination of Service**” means:

(a) As to a Consultant, the time when the engagement of a Participant as a Consultant to the Company or a Subsidiary is terminated for any reason, with or without cause, including, without limitation, by resignation, discharge, death or retirement, but excluding terminations where the Consultant simultaneously commences or remains in employment or service with the Company or any Subsidiary.

(b) As to a Non-Employee Director, the time when a Participant who is a Non-Employee Director ceases to be a Director for any reason, including, without limitation, a termination by resignation, failure to be elected, death or retirement, but excluding terminations where the Participant simultaneously commences or remains in employment or service with the Company or any Subsidiary.

(c) As to an Employee, the time when the employee-employer relationship between a Participant and the Company or any Subsidiary is terminated for any reason, including, without limitation, a termination by resignation, discharge, death, disability or retirement; but excluding terminations where the Participant simultaneously commences or remains in employment or service with the Company or any Subsidiary.

The Company, in its sole discretion, shall determine the effect of all matters and questions relating to any Termination of Service, including, without limitation, whether a Termination of Service has occurred, whether a Termination of Service resulted from a discharge for “cause” and all questions of whether particular leaves of absence constitute a Termination of Service. For purposes of the Plan, a Participant’s employee-employer relationship or consultancy relationship shall be deemed to be terminated in the event that the Subsidiary employing or contracting with such Participant ceases to remain a Subsidiary following any merger, sale of stock or other corporate transaction or event (including, without limitation, a spin-off), even though the Participant may subsequently continue to perform services for that entity.

ARTICLE III. ELIGIBILITY

Service Providers are eligible to be granted Awards under the Plan, subject to the limitations described herein. No Service Provider shall have any right to be granted an Award pursuant to the Plan and neither the Company nor the Administrator is obligated to treat Service Providers, Participants or any other persons uniformly.

ARTICLE IV. ADMINISTRATION AND DELEGATION

4.1 Administration.

(a) The Plan is administered by the Administrator. The Administrator has authority to determine which Service Providers receive Awards, grant Awards and set Award terms and conditions, subject to the conditions and limitations in the Plan. The Administrator also has the authority to take all actions and make all determinations under the Plan, to interpret the Plan and Award Agreements and to adopt, amend and repeal Plan administrative rules, guidelines and practices as it deems advisable. The

Administrator may correct defects and ambiguities, supply omissions, reconcile inconsistencies in the Plan or any Award and make all other determinations that it deems necessary or appropriate to administer the Plan and any Awards. The Administrator (and each member thereof) is entitled to, in good faith, rely or act upon any report or other information furnished to it, him or her by any officer or other employee of the Company or any Subsidiary, the Company's independent certified public accountants, or any executive compensation consultant or other professional retained by the Company to assist in the administration of the Plan. The Administrator's determinations under the Plan are in its sole discretion and will be final, binding and conclusive on all persons having or claiming any interest in the Plan or any Award.

(b) Without limiting the foregoing, the Administrator has the exclusive power, authority and sole discretion to: (i) designate Participants; (ii) determine the type or types of Awards to be granted to each Participant; (iii) determine the number of Awards to be granted and the number of Shares to which an Award will relate; (iv) subject to the limitations in the Plan, determine the terms and conditions of any Award and related Award Agreement, including, but not limited to, the exercise price, grant price, purchase price, any performance criteria, any restrictions or limitations on the Award, any schedule for vesting, lapse of forfeiture restrictions or restrictions on the exercisability of an Award, and accelerations, waivers or amendments thereof; (v) determine whether, to what extent, and under what circumstances an Award may be settled in, or the exercise price of an Award may be paid in cash, Shares, or other property, or an Award may be canceled, forfeited, or surrendered; and (vi) make all other decisions and determinations that may be required pursuant to the Plan or as the Administrator deems necessary or advisable to administer the Plan.

4.2 Delegation of Authority. To the extent permitted by Applicable Law, the Board or any Committee may delegate any or all of its powers under the Plan to one or more Committees or officers of the Company or any of its Subsidiaries; provided, however, that in no event shall an officer of the Company or any of its Subsidiaries be delegated the authority to grant Awards to, or amend Awards held by, the following individuals: (a) individuals who are subject to Section 16 of the Exchange Act, or (b) officers of the Company or any of its Subsidiaries or Directors to whom authority to grant or amend Awards has been delegated hereunder. Any delegation hereunder shall be subject to the restrictions and limits that the Board or Committee specifies at the time of such delegation or that are otherwise included in the applicable organizational documents, and the Board or Committee, as applicable, may at any time rescind the authority so delegated or appoint a new delegatee. At all times, the delegatee appointed under this Section 4.2 shall serve in such capacity at the pleasure of the Board or the Committee, as applicable, and the Board or the Committee may abolish any committee at any time and re-vest in itself any previously delegated authority. Further, regardless of any delegation, the Board or a Committee may, in its discretion, exercise any and all rights and duties as the Administrator under the Plan delegated thereby, except with respect to Awards that are required to be determined in the sole discretion of the Committee under the rules of any securities exchange or automated quotation system on which the Shares are listed, quoted or traded.

ARTICLE V. STOCK AVAILABLE FOR AWARDS

5.1 Number of Shares. Subject to adjustment under Article IX and the terms of this Article V, Awards may be made under the Plan covering up to the Overall Share Limit. As of the Effective Date, the Company will cease granting awards under the Prior Plan; however, Prior Plan Awards will remain subject to the terms of the Prior Plan. Shares issued or delivered under the Plan may consist of authorized but unissued Shares, Shares purchased on the open market or treasury Shares.

5.2 Share Recycling.

(a) If all or any part of an Award or Prior Plan Award expires, lapses or is terminated, converted into an award in respect of shares of another entity in connection with a spin-off or other similar event, exchanged for cash, surrendered, repurchased, canceled without having been fully exercised or forfeited, in any case, in a manner that results in the Company acquiring Shares covered by the Award or Prior Plan Award at a price not greater than the price (as adjusted to reflect any Equity Restructuring) paid by the Participant for such Shares or not issuing any Shares covered by the Award or Prior Plan Award, the unused Shares covered by the Award or Prior Plan Award will, as applicable, become or again be available for Awards under the Plan. The payment of Dividend Equivalents in cash in conjunction with any outstanding Awards or Prior Plan Awards shall not count against the Overall Share Limit.

(b) In addition, the following Shares shall be available for future grants of Awards: (i) Shares tendered by a Participant or withheld by the Company in payment of the exercise price of an Option or any stock option granted under the Prior Plan; (ii) Shares tendered by the Participant or withheld by the Company to satisfy any tax withholding obligation with respect to an Award or any award granted under the Prior Plan; and (iii) Shares subject to a Stock Appreciation Right that are not issued in connection with the stock settlement of the Stock Appreciation Right on exercise thereof. Notwithstanding the provisions of this Section 5.2(b), no Shares may again be optioned, granted or awarded pursuant to an Incentive Stock Option if such action would cause such Option to fail to qualify as an incentive stock option under Section 422 of the Code.

5.3 Incentive Stock Option Limitations. Notwithstanding anything to the contrary herein, no more than 18,000,000 Shares (as adjusted to reflect any Equity Restructuring) may be issued pursuant to the exercise of Incentive Stock Options.

5.4 Substitute Awards. In connection with an entity's merger or consolidation with the Company or any Subsidiary or the Company's or any Subsidiary's acquisition of an entity's property or stock, the Administrator may grant Awards in substitution for any options or other stock or stock-based awards granted before such merger or consolidation by such entity or its affiliate. Substitute Awards may be granted on such terms and conditions as the Administrator deems appropriate, notwithstanding limitations on Awards in the Plan. Substitute Awards will not count against the Overall Share Limit (nor shall Shares subject to a Substitute Award be added to the Shares available for Awards under the Plan as provided above), except that Shares acquired by exercise of substitute Incentive Stock Options will count against the maximum number of Shares that may be issued pursuant to the exercise of Incentive Stock Options under the Plan. Additionally, in the event that a company acquired by the Company or any Subsidiary or with which the Company or any Subsidiary combines has shares available under a pre-existing plan approved by stockholders and not adopted in contemplation of such acquisition or combination, the shares available for grant pursuant to the terms of such pre-existing plan (as appropriately adjusted to reflect the transaction) may be used for Awards under the Plan and shall not reduce the Shares authorized for grant under the Plan (and Shares subject to such Awards may again become available for Awards under the Plan as provided under Section 5.2 above); provided that Awards using such available shares shall not be made after the date awards or grants could have been made under the terms of the pre-existing plan, absent the acquisition or combination, and shall only be made to individuals who were not employees or directors of the Company or any of its Subsidiaries prior to such acquisition or combination.

5.5 Non-Employee Director Award Limit. Notwithstanding any provision to the contrary in the Plan or in any policy of the Company regarding non-employee director compensation, the sum of the grant date fair value (determined as of the grant date in accordance with Financial Accounting Standards Board Accounting Standards Codification Topic 718, or any successor thereto) of all equity-based Awards and the maximum amount that may become payable pursuant to all cash-based Awards that may be granted to a Service Provider as compensation for services as a Non-Employee Director during any calendar year shall not exceed \$1,000,000 for such Service Provider's first year of service as a Non-Employee Director and \$500,000 for each year thereafter.

ARTICLE VI.
STOCK OPTIONS AND STOCK APPRECIATION RIGHTS

6.1 General. The Administrator may grant Options or Stock Appreciation Rights to one or more Service Providers, subject to such terms and conditions not inconsistent with the Plan as the Administrator shall determine. The Administrator will determine the number of Shares covered by each Option and Stock Appreciation Right, the exercise price of each Option and Stock Appreciation Right and the conditions and limitations applicable to the exercise of each Option and Stock Appreciation Right. A Stock Appreciation Right will entitle the Participant (or other person entitled to exercise the Stock Appreciation Right) to receive from the Company upon exercise of the exercisable portion of the Stock Appreciation Right an amount determined by multiplying the excess, if any, of the Fair Market Value of one Share on the date of exercise over the exercise price per Share of the Stock Appreciation Right by the number of Shares with respect to which the Stock Appreciation Right is exercised, subject to any limitations of the Plan or that the Administrator may impose and payable in cash, Shares valued at Fair Market Value on the date of exercise or a combination of the two as the Administrator may determine or provide in the Award Agreement.

6.2 Exercise Price. The Administrator will establish each Option's and Stock Appreciation Right's exercise price and specify the exercise price in the Award Agreement. Subject to Section 6.6, the exercise price will not be less than 100% of the Fair Market Value on the grant date of the Option or Stock Appreciation Right. Notwithstanding the foregoing, in the case of an Option or Stock Appreciation Right that is a Substitute Award, the exercise price per share of the Shares subject to such Option or Stock Appreciation Right, as applicable, may be less than the Fair Market Value per share on the date of grant; provided that the exercise price of any Substitute Award shall be determined in accordance with the applicable requirements of Section 424 and 409A of the Code.

6.3 Duration of Options. Subject to Section 6.6, each Option or Stock Appreciation Right will be exercisable at such times and as specified in the Award Agreement, provided that the term of an Option or Stock Appreciation Right will not exceed ten years; provided, further, that, unless otherwise determined by the Administrator, (a) no portion of an Option or Stock Appreciation Right which is unexercisable at a Participant's Termination of Service shall thereafter become exercisable and (b) the portion of an Option or Stock Appreciation Right that is unexercisable at a Participant's Termination of Service shall automatically expire on the date of such Termination of Service. Notwithstanding the foregoing, if the Participant, prior to the end of the term of an Option or Stock Appreciation Right, commits an act of "cause" (as determined by the Administrator), or violates any non-competition, non-solicitation or confidentiality provisions of any employment contract, confidentiality and nondisclosure agreement or other agreement between the Participant and the Company or any of its Subsidiaries, the right to exercise the Option or Stock Appreciation Right, as applicable, may be terminated by the Company and the Company may suspend the Participant's right to exercise the Option or Stock Appreciation Right when it reasonably believes that the Participant may have participated in any such act or violation.

6.4 Exercise. Options and Stock Appreciation Rights may be exercised by delivering to the Company (or such other person or entity designated by the Administrator) a notice of exercise, in a form and manner the Company approves (which may be written, electronic or telephonic and may contain representations and warranties deemed advisable by the Administrator), signed or authenticated by the person authorized to exercise the Option or Stock Appreciation Right, together with, as applicable,

payment in full of (a) the exercise price for the number of Shares for which the Option is exercised in a manner specified in Section 6.5 and (b) all applicable taxes in a manner specified in Section 10.5. The Administrator may, in its discretion, limit exercise with respect to fractional Shares and require that any partial exercise of an Option or Stock Appreciation Right be with respect to a minimum number of Shares.

6.5 Payment Upon Exercise. The Administrator shall determine the methods by which payment of the exercise price of an Option shall be made, including, without limitation:

(a) cash, check or wire transfer of immediately available funds; provided that the Company may limit the use of one of the foregoing methods if one or more of the methods below is permitted;

(b) if there is a public market for Shares at the time of exercise, unless the Company otherwise determines, (A) delivery (including electronically or telephonically to the extent permitted by the Company) of a notice that the Participant has placed a market sell order with a broker acceptable to the Company with respect to Shares then issuable upon exercise of the Option and that the broker has been directed to deliver promptly to the Company funds sufficient to pay the exercise price, or (B) the Participant's delivery to the Company of a copy of irrevocable and unconditional instructions to a broker acceptable to the Company to deliver promptly to the Company an amount sufficient to pay the exercise price by cash, wire transfer of immediately available funds or check; provided that such amount is paid to the Company at such time as may be required by the Company;

(c) to the extent permitted by the Administrator, delivery (either by actual delivery or attestation) of Shares owned by the Participant valued at their Fair Market Value on the date of delivery;

(d) to the extent permitted by the Administrator, surrendering Shares then issuable upon the Option's exercise valued at their Fair Market Value on the exercise date;

(e) to the extent permitted by the Administrator, delivery of a promissory note or any other lawful consideration; or

(f) to the extent permitted by the Administrator, any combination of the above payment forms.

6.6 Additional Terms of Incentive Stock Options. The Administrator may grant Incentive Stock Options only to employees of the Company, any of its present or future parent or subsidiary corporations, as defined in Sections 424(e) or (f) of the Code, respectively, and any other entities the employees of which are eligible to receive Incentive Stock Options under the Code. If an Incentive Stock Option is granted to a Greater Than 10% Stockholder, the exercise price will not be less than 110% of the Fair Market Value on the Option's grant date, and the term of the Option will not exceed five years. All Incentive Stock Options (and Award Agreements related thereto) will be subject to and construed consistently with Section 422 of the Code. By accepting an Incentive Stock Option, the Participant agrees to give prompt notice to the Company of dispositions or other transfers (other than in connection with a Change in Control) of Shares acquired under the Option made within (a) two years from the grant date of the Option or (b) one year after the transfer of such Shares to the Participant, specifying the date of the disposition or other transfer and the amount the Participant realized, in cash, other property, assumption of indebtedness or other consideration, in such disposition or other transfer. Neither the Company nor the Administrator will be liable to a Participant, or any other party, if an Incentive Stock Option fails or ceases to qualify as an "incentive stock option" under Section 422 of the Code. Any Incentive Stock

Option or portion thereof that fails to qualify as an “incentive stock option” under Section 422 of the Code for any reason, including becoming exercisable with respect to Shares having a fair market value exceeding the \$100,000 limitation under Treasury Regulation Section 1.422-4, will be a Nonqualified Stock Option.

ARTICLE VII. RESTRICTED STOCK; RESTRICTED STOCK UNITS

7.1 General. The Administrator may grant Restricted Stock, or the right to purchase Restricted Stock, to any Service Provider, subject to forfeiture or the Company’s right to repurchase all or part of such shares at their issue price or other stated or formula price from the Participant if conditions the Administrator specifies in the Award Agreement are not satisfied before the end of the applicable restriction period or periods that the Administrator establishes for such Award. In addition, the Administrator may grant Restricted Stock Units, which may be subject to vesting and forfeiture conditions during the applicable restriction period or periods, as set forth in an Award Agreement, to Service Providers. The Administrator shall establish the purchase price, if any, and form of payment for Restricted Stock and Restricted Stock Units; provided, however, that if a purchase price is charged, such purchase price shall be no less than the par value, if any, of the Shares to be purchased, unless otherwise permitted by Applicable Law. In all cases, legal consideration shall be required for each issuance of Restricted Stock and Restricted Stock Units to the extent required by Applicable Law. The Award Agreement for each Restricted Stock and Restricted Stock Unit Award shall set forth the terms and conditions not inconsistent with the Plan as the Administrator shall determine.

7.2 Restricted Stock.

(a) *Stockholder Rights*. Unless otherwise determined by the Administrator, each Participant holding shares of Restricted Stock will be entitled to all the rights of a stockholder with respect to such Shares, subject to the restrictions in the Plan and the applicable Award Agreement, including the right to receive all dividends and other distributions paid or made with respect to the Shares to the extent such dividends and other distributions have a record date that is on or after the date on which such Participant becomes the record holder of such Shares; provided, however, that with respect to a share of Restricted Stock subject to restrictions or vesting conditions as described in Section 8.3, except in connection with a spin-off or other similar event as otherwise permitted under Section 9.2, dividends which are paid to Company stockholders prior to the removal of restrictions and satisfaction of vesting conditions shall only be paid to the Participant to the extent that the restrictions are subsequently removed and the vesting conditions are subsequently satisfied and the share of Restricted Stock vests.

(b) *Stock Certificates*. The Company may require that the Participant deposit in escrow with the Company (or its designee) any stock certificates issued in respect of shares of Restricted Stock, together with a stock power endorsed in blank.

(c) *Section 83(b) Election*. If a Participant makes an election under Section 83(b) of the Code to be taxed with respect to the Restricted Stock as of the date of transfer of the Restricted Stock rather than as of the date or dates upon which such Participant would otherwise be taxable under Section 83(a) of the Code, such Participant shall be required to deliver a copy of such election to the Company promptly after filing such election with the Internal Revenue Service along with proof of the timely filing thereof.

7.3 Restricted Stock Units. The Administrator may provide that settlement of Restricted Stock Units will occur upon or as soon as reasonably practicable after the Restricted Stock Units vest or will instead be deferred, on a mandatory basis or at the Participant’s election, subject to compliance with Applicable Law.

**ARTICLE VIII.
OTHER TYPES OF AWARDS**

8.1 General. The Administrator may grant Performance Stock Unit awards, Performance Bonus Awards, Dividend Equivalents or Other Stock or Cash Based Awards, to one or more Service Providers, in such amounts and subject to such terms and conditions not inconsistent with the Plan as the Administrator shall determine.

8.2 Performance Stock Unit Awards. Each Performance Stock Unit award shall be denominated in a number of Shares or in unit equivalents of Shares or units of value (including a dollar value of Shares) and may be linked to any one or more of performance or other specific criteria, including service to the Company or Subsidiaries, determined to be appropriate by the Administrator, in each case on a specified date or dates or over any period or periods determined by the Administrator. In making such determinations, the Administrator may consider (among such other factors as it deems relevant in light of the specific type of award) the contributions, responsibilities and other compensation of the particular Participant.

8.3 Performance Bonus Awards. Each right to receive a bonus granted under this Section 8.3 shall be denominated in the form of cash (but may be payable in cash, stock or a combination thereof) (a "**Performance Bonus Award**") and shall be payable upon the attainment of performance goals that are established by the Administrator and relate to one or more of performance or other specific criteria, including service to the Company or Subsidiaries, in each case on a specified date or dates or over any period or periods determined by the Administrator.

8.4 Dividend Equivalents. If the Administrator provides, an Award (other than an Option or Stock Appreciation Right) may provide a Participant with the right to receive Dividend Equivalents. Dividend Equivalents may be paid currently or credited to an account for the Participant, settled in cash or Shares and subject to the same restrictions on transferability and forfeitability as the Award with respect to which the Dividend Equivalents are granted and subject to other terms and conditions as set forth in the Award Agreement. Notwithstanding anything to the contrary herein, Dividend Equivalents with respect to an Award subject to vesting shall either (i) to the extent permitted by Applicable Law, not be paid or credited or (ii) be accumulated and subject to vesting to the same extent as the related Award. All such Dividend Equivalents shall be paid at such time as the Administrator shall specify in the applicable Award Agreement.

8.5 Other Stock or Cash Based Awards. Other Stock or Cash Based Awards may be granted to Participants, including Awards entitling Participants to receive cash or Shares to be delivered in the future and annual or other periodic or long-term cash bonus awards (whether based on specified performance criteria or otherwise), in each case subject to any conditions and limitations in the Plan. Such Other Stock or Cash Based Awards will also be available as a payment form in the settlement of other Awards, as standalone payments and as payment in lieu of compensation to which a Participant is otherwise entitled. Other Stock or Cash Based Awards may be paid in Shares, cash or other property, as the Administrator determines. Subject to the provisions of the Plan, the Administrator will determine the terms and conditions of each Other Stock or Cash Based Award, including any purchase price, performance goal(s), transfer restrictions, and vesting conditions, which will be set forth in the applicable Award Agreement. Except in connection with a spin-off or other similar event as otherwise permitted under Article IX, dividends that are paid prior to vesting of any Other Stock or Cash Based Award shall only be paid to the applicable Participant to the extent that the vesting conditions are subsequently satisfied and the Other Stock or Cash Based Award vests.

**ARTICLE IX.
ADJUSTMENTS FOR CHANGES IN COMMON STOCK
AND CERTAIN OTHER EVENTS**

9.1 Equity Restructuring. In connection with any Equity Restructuring, notwithstanding anything to the contrary in this Article IX the Administrator will equitably adjust the terms of the Plan and each outstanding Award as it deems appropriate to reflect the Equity Restructuring, which may include (i) adjusting the number and type of securities subject to each outstanding Award or with respect to which Awards may be granted under the Plan (including, but not limited to, adjustments of the limitations in Article V hereof on the maximum number and kind of shares that may be issued); (ii) adjusting the terms and conditions of (including the grant or exercise price), and the performance goals or other criteria included in, outstanding Awards; and (iii) granting new Awards or making cash payments to Participants. The adjustments provided under this Section 9.1 will be nondiscretionary and final and binding on all interested parties, including the affected Participant and the Company; provided that the Administrator will determine whether an adjustment is equitable.

9.2 Corporate Transactions. In the event of any dividend or other distribution (whether in the form of cash, Common Stock, other securities, or other property), reorganization, merger, consolidation, split-up, spin off, combination, amalgamation, repurchase, recapitalization, liquidation, dissolution, or sale, transfer, exchange or other disposition of all or substantially all of the assets of the Company, or sale or exchange of Common Stock or other securities of the Company, Change in Control, issuance of warrants or other rights to purchase Common Stock or other securities of the Company, other similar corporate transaction or event, other unusual or nonrecurring transaction or event affecting the Company or its financial statements or any change in any Applicable Law or accounting principles, the Administrator, on such terms and conditions as it deems appropriate, either by the terms of the Award or by action taken prior to the occurrence of such transaction or event (except that action to give effect to a change in Applicable Law or accounting principles may be made within a reasonable period of time after such change) and either automatically or upon the Participant's request, is hereby authorized to take any one or more of the following actions whenever the Administrator determines that such action is appropriate in order to (x) prevent dilution or enlargement of the benefits or potential benefits intended by the Company to be made available under the Plan or with respect to any Award granted or issued under the Plan, (y) to facilitate such transaction or event or (z) give effect to such changes in Applicable Law or accounting principles:

(a) To provide for the cancellation of any such Award in exchange for either an amount of cash or other property with a value equal to the amount that could have been obtained upon the exercise or settlement of the vested portion of such Award or realization of the Participant's rights under the vested portion of such Award, as applicable; provided that, if the amount that could have been obtained upon the exercise or settlement of the vested portion of such Award or realization of the Participant's rights, in any case, is equal to or less than zero, then the Award may be terminated without payment;

(b) To provide that such Award shall vest and, to the extent applicable, be exercisable as to all Shares (or other property) covered thereby, notwithstanding anything to the contrary in the Plan or the provisions of such Award;

(c) To provide that such Award be assumed by the successor or survivor corporation or entity, or a parent or subsidiary thereof, or shall be substituted for by awards covering the stock of the successor or survivor corporation or entity, or a parent or subsidiary thereof, with appropriate adjustments as to the number and kind of shares and applicable exercise or purchase price, in all cases, as determined by the Administrator;

(d) To make adjustments in the number and type of shares of Common Stock (or other securities or property) subject to outstanding Awards or with respect to which Awards may be granted under the Plan (including, but not limited to, adjustments of the limitations in Article V hereof on the maximum number and kind of shares which may be issued) or in the terms and conditions of (including the grant or exercise price), and the criteria included in, outstanding Awards;

(e) To replace such Award with other rights or property selected by the Administrator; or

(f) To provide that the Award will terminate and cannot vest, be exercised or become payable after the applicable event.

9.3 Change in Control.

(a) Notwithstanding any other provision of the Plan, in the event of a Change in Control, unless the Administrator elects to (i) terminate an Award in exchange for cash, rights or property, or (ii) cause an Award to become fully exercisable and no longer subject to any forfeiture restrictions prior to the consummation of a Change in Control, pursuant to Section 9.2, (A) such Award (other than any portion subject to performance-based vesting) shall continue in effect or be assumed or an equivalent Award substituted by the successor corporation or a parent or subsidiary of the successor corporation and (B) the portion of such Award subject to performance-based vesting shall be subject to the terms and conditions of the applicable Award Agreement and, in the absence of applicable terms and conditions, the Administrator's discretion.

(b) In the event that the successor corporation in a Change in Control refuses to assume or substitute for an Award (other than any portion subject to performance-based vesting), the Administrator shall cause such Award to become fully vested and, if applicable, exercisable immediately prior to the consummation of such transaction and all forfeiture restrictions on such Award to lapse and, to the extent unexercised upon the consummation of such transaction, to terminate in exchange for cash, rights or other property. The Administrator shall notify the Participant of any Award that becomes exercisable pursuant to the preceding sentence that such Award shall be fully exercisable for a period of 15 days from the date of such notice, contingent upon the occurrence of the Change in Control, and such Award shall terminate upon the consummation of the Change in Control in accordance with the preceding sentence.

(c) For the purposes of this Section 9.3, an Award shall be considered assumed if, following the Change in Control, the Award confers the right to purchase or receive, for each Share subject to the Award immediately prior to the Change in Control, the consideration (whether stock, cash, or other securities or property) received in the Change in Control by holders of Common Stock for each Share held on the effective date of the transaction (and if holders were offered a choice of consideration, the type of consideration chosen by the holders of a majority of the outstanding Shares); provided, however, that if such consideration received in the Change in Control was not solely common stock of the successor corporation or its parent, the Administrator may, with the consent of the successor corporation, provide for the consideration to be received upon the exercise of the Award, for each Share subject to an Award, to be solely common stock of the successor corporation or its parent equal in fair market value to the per-share consideration received by holders of Common Stock in the Change in Control.

9.4 Administrative Stand Still. In the event of any pending stock dividend, stock split, combination or exchange of shares, merger, consolidation or other distribution (other than normal cash dividends) of Company assets to stockholders, or any other extraordinary transaction or change affecting the Shares or the share price of Common Stock (including any Equity Restructuring or any securities offering or other similar transaction) or for reasons of administrative convenience or to facilitate compliance with any Applicable Law, the Company may refuse to permit the exercise or settlement of one or more Awards for such period of time as the Company may determine to be reasonably appropriate under the circumstances.

9.5 General. Except as expressly provided in the Plan or the Administrator's action under the Plan, no Participant will have any rights due to any subdivision or consolidation of Shares of any class, dividend payment, increase or decrease in the number of Shares of any class or dissolution, liquidation, merger, or consolidation of the Company or other corporation. Except as expressly provided with respect to an Equity Restructuring under Section 9.1 above or the Administrator's action under the Plan, no issuance by the Company of Shares of any class, or securities convertible into Shares of any class, will affect, and no adjustment will be made regarding, the number of Shares subject to an Award or the Award's grant or exercise price. The existence of the Plan, any Award Agreements and the Awards granted hereunder will not affect or restrict in any way the Company's right or power to make or authorize (i) any adjustment, recapitalization, reorganization or other change in the Company's capital structure or its business, (ii) any merger, consolidation, spinoff, dissolution or liquidation of the Company or sale of Company assets or (iii) any sale or issuance of securities, including securities with rights superior to those of the Shares or securities convertible into or exchangeable for Shares.

ARTICLE X. PROVISIONS APPLICABLE TO AWARDS

10.1 Transferability.

(a) No Award may be sold, assigned, transferred, pledged or otherwise encumbered, either voluntarily or by operation of law, except by will or the laws of descent and distribution, or, subject to the Administrator's consent, pursuant to a domestic relations order, unless and until such Award has been exercised or the Shares underlying such Award have been issued, and all restrictions applicable to such Shares have lapsed. During the life of a Participant, Awards will be exercisable only by the Participant, unless it has been disposed of pursuant to a domestic relations order. After the death of a Participant, any exercisable portion of an Award may, prior to the time when such portion becomes unexercisable under the Plan or the applicable Award Agreement, be exercised by the Participant's personal representative or by any person empowered to do so under the deceased Participant's will or under the then-Applicable Law of descent and distribution. References to a Participant, to the extent relevant in the context, will include references to a transferee approved by the Administrator.

(b) Notwithstanding Section 10.1(a), the Administrator, in its sole discretion, may determine to permit a Participant or a Permitted Transferee of such Participant to transfer an Award other than an Incentive Stock Option (unless such Incentive Stock Option is intended to become a Nonqualified Stock Option) to any one or more Permitted Transferees of such Participant, subject to the following terms and conditions: (i) an Award transferred to a Permitted Transferee shall not be assignable or transferable by the Permitted Transferee other than (A) to another Permitted Transferee of the applicable Participant or (B) by will or the laws of descent and distribution or, subject to the consent of the Administrator, pursuant to a domestic relations order; (ii) an Award transferred to a Permitted Transferee shall continue to be subject to all the terms and conditions of the Award as applicable to the original Participant (other than the ability to further transfer the Award to any Person other than another Permitted Transferee of the applicable Participant); (iii) the Participant (or transferring Permitted Transferee) and

the receiving Permitted Transferee shall execute any and all documents requested by the Administrator, including, without limitation documents to (A) confirm the status of the transferee as a Permitted Transferee, (B) satisfy any requirements for an exemption for the transfer under Applicable Law and (C) evidence the transfer; and (iv) any transfer of an Award to a Permitted Transferee shall be without consideration, except as required by Applicable Law. In addition, and further notwithstanding Section 10.1(a), the Administrator, in its sole discretion, may determine to permit a Participant to transfer Incentive Stock Options to a trust that constitutes a Permitted Transferee if, under Section 671 of the Code and other Applicable Law, the Participant is considered the sole beneficial owner of the Incentive Stock Option while it is held in the trust.

(c) Notwithstanding Section 10.1(a), a Participant may, in the manner determined by the Administrator, designate a Designated Beneficiary. A Designated Beneficiary, legal guardian, legal representative, or other person claiming any rights pursuant to the Plan is subject to all terms and conditions of the Plan and any Award Agreement applicable to the Participant and any additional restrictions deemed necessary or appropriate by the Administrator. If the Participant is married or a domestic partner in a domestic partnership qualified under Applicable Law and resides in a community property state, a designation of a person other than the Participant's spouse or domestic partner, as applicable, as the Participant's Designated Beneficiary with respect to more than 50% of the Participant's interest in the Award shall not be effective without the prior written or electronic consent of the Participant's spouse or domestic partner. Subject to the foregoing, a beneficiary designation may be changed or revoked by a Participant at any time; provided that the change or revocation is delivered in writing to the Administrator prior to the Participant's death.

10.2 Documentation. Each Award will be evidenced in an Award Agreement in such form as the Administrator determines in its discretion. Each Award may contain such terms and conditions as are determined by the Administrator in its sole discretion, to the extent not inconsistent with those set forth in the Plan.

10.3 Discretion. Except as the Plan otherwise provides, each Award may be made alone or in addition or in relation to any other Award. The terms of each Award to a Participant need not be identical, and the Administrator need not treat Participants or Awards (or portions thereof) uniformly.

10.4 Changes in Participant's Status. The Administrator will determine how the disability, death, retirement, authorized leave of absence or any other change or purported change in a Participant's Service Provider status affects an Award and the extent to which, and the period during which, the Participant, the Participant's legal representative, conservator, guardian or Designated Beneficiary may exercise rights under the Award, if applicable. Except to the extent otherwise required by law or expressly authorized by the Company or by the Company's written policy on leaves of absence, no Service credit shall be given for vesting purposes for any period the Participant is on a leave of absence.

10.5 Withholding. Each Participant must pay the Company, or make provision satisfactory to the Administrator for payment of, any taxes required by law to be withheld in connection with such Participant's Awards by the date of the event creating the tax liability. The Company may deduct an amount sufficient to satisfy such tax obligations from any payment of any kind otherwise due to a Participant. The amount deducted shall be determined by the Company and may be up to, but no greater than, the aggregate amount of such obligations based on the maximum statutory withholding rates in the applicable Participant's jurisdiction for federal, state, local and foreign income tax and payroll tax purposes that are applicable to such taxable income. Subject to any Company insider trading policy (including blackout periods), Participants may satisfy such tax obligations (i) in cash, by wire transfer of immediately available funds, by check made payable to the order of the Company; provided that the Company may limit the use of one of the foregoing methods if one or more of the exercise methods below

is permitted, (ii) to the extent permitted by the Administrator, in whole or in part by delivery of Shares, including Shares delivered by attestation and Shares retained from the Award creating the tax obligation, valued at their Fair Market Value on the date of delivery, (iii) if there is a public market for Shares at the time the tax obligations are satisfied, unless the Administrator otherwise determines, (A) delivery (including electronically or telephonically to the extent permitted by the Company) of a notice that the Participant has placed a market sell order with a broker acceptable to the Company with respect to Shares then issuable upon exercise of the Option and that the broker has been directed to deliver promptly to the Company funds sufficient to satisfy the tax obligations, or (B) the Participant's delivery to the Company of a copy of irrevocable and unconditional instructions to a broker acceptable to the Company to deliver promptly to the Company an amount sufficient to satisfy the tax withholding by cash, wire transfer of immediately available funds or check; provided that such amount is paid to the Company at such time as may be required by the Company, (iv) to the extent permitted by the Administrator, delivery of a promissory note or any other lawful consideration or (v) to the extent permitted by the Administrator, any combination of the foregoing payment forms. If any tax withholding obligation will be satisfied under clause (ii) of the immediately preceding sentence by the Company's retention of Shares from the Award creating the tax obligation and there is a public market for Shares at the time the tax obligation is satisfied, the Company may elect to instruct any brokerage firm determined acceptable to the Company for such purpose to sell on the applicable Participant's behalf some or all of the Shares retained and to remit the proceeds of the sale to the Company or its designee, and each Participant's acceptance of an Award under the Plan will constitute the Participant's authorization to the Company and instruction and authorization to such brokerage firm to complete the transactions described in this sentence.

10.6 Amendment of Award; Repricing. The Administrator may amend, modify or terminate any outstanding Award, including by substituting another Award of the same or a different type, changing the exercise or settlement date, and converting an Incentive Stock Option to a Nonqualified Stock Option. The Participant's consent to such action will be required unless (i) the action, taking into account any related action, does not materially and adversely affect the Participant's rights under the Award, or (ii) the change is permitted under Article IX or pursuant to Section 11.6. In addition, the Administrator shall, without the approval of the stockholders of the Company, have the authority to (a) amend any outstanding Option or Stock Appreciation Right to reduce its exercise price per Share, or (b) cancel any Option or Stock Appreciation Right in exchange for cash or another Award.

10.7 Conditions on Delivery of Stock. The Company will not be obligated to deliver any Shares under the Plan or remove restrictions from Shares previously delivered under the Plan until (i) all Award conditions have been met or removed to the Company's satisfaction, (ii) as determined by the Company, all other legal matters regarding the issuance and delivery of such Shares have been satisfied, including any applicable securities laws and stock exchange or stock market rules and regulations, and (iii) the Participant has executed and delivered to the Company such representations or agreements as the Administrator deems necessary or appropriate to satisfy Applicable Law. The Company's inability to obtain authority from any regulatory body having jurisdiction, which the Administrator determines is necessary to the lawful issuance and sale of any securities, will relieve the Company of any liability for failing to issue or sell such Shares as to which such requisite authority has not been obtained.

10.8 Acceleration. The Administrator may at any time provide that any Award will become immediately vested and fully or partially exercisable, free of some or all restrictions or conditions, or otherwise fully or partially realizable.

**ARTICLE XI.
MISCELLANEOUS**

11.1 No Right to Employment or Other Status. No person will have any claim or right to be granted an Award, and the grant of an Award will not be construed as giving a Participant the right to continue employment or any other relationship with the Company. The Company expressly reserves the right at any time to dismiss or otherwise terminate its relationship with a Participant free from any liability or claim under the Plan or any Award, except as expressly provided in an Award Agreement or other written agreement between the Participant and the Company or any Subsidiary.

11.2 No Rights as Stockholder; Certificates. Subject to the Award Agreement, no Participant or Designated Beneficiary will have any rights as a stockholder with respect to any Shares to be distributed under an Award until becoming the record holder of such Shares. Notwithstanding any other provision of the Plan, unless the Administrator otherwise determines or Applicable Law requires, the Company will not be required to deliver to any Participant certificates evidencing Shares issued in connection with any Award and instead such Shares may be recorded in the books of the Company (or, as applicable, its transfer agent or stock plan administrator). The Company may place legends on any share certificate or book entry to reference restrictions applicable to the Shares (including, without limitation, restrictions applicable to Restricted Stock).

11.3 Effective Date. The Plan will become effective on the day prior to the Public Trading Date (the “*Effective Date*”). No Incentive Stock Option may be granted pursuant to the Plan after the tenth anniversary of the earlier of (i) the date the Plan was approved by the Board and (ii) the date the Plan was approved by the Company’s stockholders.

11.4 Amendment of Plan. The Board may amend, suspend or terminate the Plan at any time and from time to time; provided that (a) no amendment requiring stockholder approval to comply with Applicable Law shall be effective unless approved by the Board, and (b) no amendment, other than an increase to the Overall Share Limit or pursuant to Article IX or Section 11.6, may materially and adversely affect any Award outstanding at the time of such amendment without the affected Participant’s consent. No Awards may be granted under the Plan during any suspension period or after Plan termination. Awards outstanding at the time of any Plan suspension or termination will continue to be governed by the Plan and the Award Agreement, as in effect before such suspension or termination. The Board will obtain stockholder approval of any Plan amendment to the extent necessary to comply with Applicable Law.

11.5 Provisions for Foreign Participants. The Administrator may modify Awards granted to Participants who are foreign nationals or employed outside the United States, establish subplans or procedures under the Plan or take any other necessary or appropriate action to address Applicable Law, including (a) differences in laws, rules, regulations or customs of such foreign jurisdictions with respect to tax, securities, currency, employee benefit or other matters, (b) listing and other requirements of any foreign securities exchange, and (c) any necessary local governmental or regulatory exemptions or approvals.

11.6 Section 409A.

(a) *General*. The Company intends that all Awards be structured to comply with, or be exempt from, Section 409A, such that no adverse tax consequences, interest, or penalties under Section 409A apply. Notwithstanding anything in the Plan or any Award Agreement to the contrary, the Administrator may, without a Participant’s consent, amend this Plan or Awards, adopt policies and procedures, or take any other actions (including amendments, policies, procedures and retroactive actions) as are necessary or appropriate to preserve the intended tax treatment of Awards, including any such actions intended to (A) exempt this Plan or any Award from Section 409A, or (B) comply with Section 409A, including regulations, guidance, compliance programs and other interpretative authority

that may be issued after an Award's grant date. The Company makes no representations or warranties as to an Award's tax treatment under Section 409A or otherwise. The Company will have no obligation under this Section 11.6 or otherwise to avoid the taxes, penalties or interest under Section 409A with respect to any Award and will have no liability to any Participant or any other person if any Award, compensation or other benefits under the Plan are determined to constitute noncompliant "nonqualified deferred compensation" subject to taxes, penalties or interest under Section 409A.

(b) *Separation from Service.* If an Award constitutes "nonqualified deferred compensation" under Section 409A, any payment or settlement of such Award upon a Participant's Termination of Service will, to the extent necessary to avoid taxes under Section 409A, be made only upon the Participant's "separation from service" (within the meaning of Section 409A), whether such "separation from service" occurs upon or after the Participant's Termination of Service. For purposes of this Plan or any Award Agreement relating to any such payments or benefits, references to a "termination," "termination of employment" or like terms means a "separation from service."

(c) *Payments to Specified Employees.* Notwithstanding any contrary provision in the Plan or any Award Agreement, any payment(s) of "nonqualified deferred compensation" required to be made under an Award to a "specified employee" (as defined under Section 409A and as the Administrator determines) due to his or her "separation from service" will, to the extent necessary to avoid taxes under Section 409A(a)(2)(B)(i) of the Code, be delayed for the six-month period immediately following such "separation from service" (or, if earlier, until the specified employee's death) and will instead be paid (as set forth in the Award Agreement) on the day immediately following such six-month period or as soon as administratively practicable thereafter (without interest). Any payments of "nonqualified deferred compensation" under such Award payable more than six months following the Participant's "separation from service" will be paid at the time or times the payments are otherwise scheduled to be made.

11.7 Limitations on Liability. Notwithstanding any other provisions of the Plan, no individual acting as a director, officer or other employee of the Company or any Subsidiary will be liable to any Participant, former Participant, spouse, beneficiary, or any other person for any claim, loss, liability, or expense incurred in connection with the Plan or any Award, and such individual will not be personally liable with respect to the Plan because of any contract or other instrument executed in his or her capacity as an Administrator, director, officer or other employee of the Company or any Subsidiary. The Company will indemnify and hold harmless each director, officer or other employee of the Company or any Subsidiary that has been or will be granted or delegated any duty or power relating to the Plan's administration or interpretation, against any cost or expense (including attorneys' fees) or liability (including any sum paid in settlement of a claim with the Administrator's approval) arising from any act or omission concerning this Plan unless arising from such person's own fraud or bad faith; provided that he or she gives the Company an opportunity, at its own expense, to handle and defend the same before he or she undertakes to handle and defend it on his or her own behalf.

11.8 Data Privacy. As a condition for receiving any Award, each Participant explicitly and unambiguously consents to the collection, use and transfer, in electronic or other form, of personal data as described in this Section by and among the Company and its Subsidiaries and affiliates exclusively for implementing, administering and managing the Participant's participation in the Plan. The Company and its Subsidiaries and affiliates may hold certain personal information about a Participant, including the Participant's name, address and telephone number; birthdate; social security, insurance number or other identification number; salary; nationality; job title(s); any Shares held in the Company or its Subsidiaries and affiliates; and Award details, to implement, manage and administer the Plan and Awards (the "**Data**"). The Company and its Subsidiaries and affiliates may transfer the Data amongst themselves as necessary to implement, administer and manage a Participant's participation in the Plan, and the Company and its Subsidiaries and affiliates may transfer the Data to third parties assisting the Company

with Plan implementation, administration and management. These recipients may be located in the Participant's country, or elsewhere, and the Participant's country may have different data privacy laws and protections than the recipients' country. By accepting an Award, each Participant authorizes such recipients to receive, possess, use, retain and transfer the Data, in electronic or other form, to implement, administer and manage the Participant's participation in the Plan, including any required Data transfer to a broker or other third party with whom the Company or the Participant may elect to deposit any Shares. The Data related to a Participant will be held only as long as necessary to implement, administer, and manage the Participant's participation in the Plan. A Participant may, at any time, view the Data that the Company holds regarding such Participant, request additional information about the storage and processing of the Data regarding such Participant, recommend any necessary corrections to the Data regarding the Participant or refuse or withdraw the consents in this Section 11.8 in writing, without cost, by contacting the local human resources representative. The Company may cancel Participant's ability to participate in the Plan and, in the Administrator's sole discretion, the Participant may forfeit any outstanding Awards if the Participant refuses or withdraws the consents in this Section 11.8. For more information on the consequences of refusing or withdrawing consent, Participants may contact their local human resources representative.

11.9 Severability. If any portion of the Plan or any action taken under it is held illegal or invalid for any reason, the illegality or invalidity will not affect the remaining parts of the Plan, and the Plan will be construed and enforced as if the illegal or invalid provisions had been excluded, and the illegal or invalid action will be null and void.

11.10 Governing Documents. If any contradiction occurs between the Plan and any Award Agreement or other written agreement between a Participant and the Company (or any Subsidiary), the Plan will govern, unless such Award Agreement or other written agreement was approved by the Administrator and expressly provides that a specific provision of the Plan will not apply.

11.11 Governing Law. The Plan and all Awards will be governed by and interpreted in accordance with the laws of the State of Delaware, without regard to the conflict of law rules thereof or of any other jurisdiction.

11.12 Clawback Provisions. All Awards (including the gross amount of any proceeds, gains or other economic benefit the Participant actually or constructively receives upon receipt or exercise of any Award or the receipt or resale of any Shares underlying the Award) will be subject to recoupment by the Company to the extent required to comply with Applicable Law or any policy of the Company providing for the reimbursement of incentive compensation, whether or not such policy was in place at the time of grant of an Award.

11.13 Titles and Headings. The titles and headings in the Plan are for convenience of reference only and, if any conflict, the Plan's text, rather than such titles or headings, will control.

11.14 Conformity to Applicable Law. Participant acknowledges that the Plan is intended to conform to the extent necessary with Applicable Law. Notwithstanding anything herein to the contrary, the Plan and all Awards will be administered only in a manner intended to conform with Applicable Law. To the extent Applicable Law permit, the Plan and all Award Agreements will be deemed amended as necessary to conform to Applicable Law.

11.15 Relationship to Other Benefits. No payment under the Plan will be taken into account in determining any benefits under any pension, retirement, savings, profit sharing, group insurance, welfare or other benefit plan of the Company or any Subsidiary, except as expressly provided in writing in such other plan or an agreement thereunder.

11.16 Unfunded Status of Awards. The Plan is intended to be an “unfunded” plan for incentive compensation. With respect to any payments not yet made to a Participant pursuant to an Award, nothing contained in the Plan or Award Agreement shall give the Participant any rights that are greater than those of a general creditor of the Company or any Subsidiary.

11.17 Limitations Applicable to Section 16 Persons. Notwithstanding any other provision of the Plan, the Plan and any Award granted or awarded to any individual who is then subject to Section 16 of the Exchange Act shall be subject to any additional limitations set forth in any applicable exemptive rule under Section 16 of the Exchange Act (including Rule 16b-3 of the Exchange Act and any amendments thereto) that are requirements for the application of such exemptive rule. To the extent permitted by Applicable Law, the Plan and Awards granted or awarded hereunder shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

11.18 Prohibition on Executive Officer Loans. Notwithstanding any other provision of the Plan to the contrary, no Participant who is a Director or an “executive officer” of the Company within the meaning of Section 13(k) of the Exchange Act shall be permitted to make payment with respect to any Awards granted under the Plan, or continue any extension of credit with respect to such payment, with a loan from the Company or a loan arranged by the Company in violation of Section 13(k) of the Exchange Act.

11.19 Broker-Assisted Sales. In the event of a broker-assisted sale of Shares in connection with the payment of amounts owed by a Participant under or with respect to the Plan or Awards, including amounts to be paid under the final sentence of Section 10.5: (a) any Shares to be sold through the broker-assisted sale will be sold on the day the payment first becomes due, or as soon thereafter as practicable; (b) such Shares may be sold as part of a block trade with other Participants in the Plan in which all participants receive an average price; (c) the applicable Participant will be responsible for all broker’s fees and other costs of sale, and by accepting an Award, each Participant agrees to indemnify and hold the Company harmless from any losses, costs, damages, or expenses relating to any such sale; (d) to the extent the Company or its designee receives proceeds of such sale that exceed the amount owed, the Company will pay such excess in cash to the applicable Participant as soon as reasonably practicable; (e) the Company and its designees are under no obligation to arrange for such sale at any particular price; and (f) in the event the proceeds of such sale are insufficient to satisfy the Participant’s applicable obligation, the Participant may be required to pay immediately upon demand to the Company or its designee an amount in cash sufficient to satisfy any remaining portion of the Participant’s obligation.

* * * * *

I hereby certify that the foregoing Plan was adopted by the Board of Directors of 4D Molecular Therapeutics, Inc. on [____], 2020.

I hereby certify that the foregoing Plan was approved by the stockholders of 4D Molecular Therapeutics, Inc. on [____], 2020.

Executed on [____], 2020.

Corporate Secretary

**4D MOLECULAR THERAPEUTICS, INC.
2020 INCENTIVE AWARD PLAN
STOCK OPTION GRANT NOTICE**

4D Molecular Therapeutics, Inc., a Delaware corporation, (the "Company"), pursuant to its 2020 Incentive Award Plan, as may be amended from time to time (the "Plan"), hereby grants to the holder listed below ("Participant"), an option to purchase the number of shares of the Company's Common Stock (the "Shares"), set forth below (the "Option"). This Option is subject to all of the terms and conditions set forth herein, as well as in the Plan and the Stock Option Agreement attached hereto as Exhibit A (the "Stock Option Agreement"), each of which are incorporated herein by reference. Unless otherwise defined herein, the terms defined in the Plan shall have the same defined meanings in this Grant Notice and the Stock Option Agreement.

Participant: [_____]
Grant Date: [_____]
Vesting Commencement Date: [_____]
Exercise Price per Share: \$[____]
Total Exercise Price: \$[_____]
Total Number of Shares Subject to the Option: [____]
Expiration Date: [_____]
Vesting Schedule: [_____]

Type of Option: Incentive Stock Option Nonqualified Stock Option

By his or her signature and the Company's signature below, Participant agrees to be bound by the terms and conditions of the Plan, the Stock Option Agreement, and this Grant Notice. Participant has reviewed the Stock Option Agreement, the Plan and this Grant Notice in their entirety, has had an opportunity to obtain the advice of counsel prior to executing this Grant Notice and fully understands all provisions of this Grant Notice, the Stock Option Agreement and the Plan. Participant hereby agrees to accept as binding, conclusive and final all decisions or interpretations of the Administrator upon any questions arising under the Plan, this Grant Notice or the Stock Option Agreement.

4D MOLECULAR THERAPEUTICS, INC.:

By: _____
 Print Name: _____
 Title: _____
 Address: _____

PARTICIPANT:

By: _____
 Print Name: _____
 Address: _____

**EXHIBIT A
TO STOCK OPTION GRANT NOTICE**

STOCK OPTION AGREEMENT

Pursuant to the Stock Option Grant Notice (the “Grant Notice”) to which this Stock Option Agreement (this “Agreement”) is attached, 4D Molecular Therapeutics, Inc., a Delaware corporation (the “Company”), has granted to Participant an Option under the Company’s 2020 Incentive Award Plan, as may be amended from time to time (the “Plan”), to purchase the number of Shares indicated in the Grant Notice.

ARTICLE 1.

GENERAL

1.1 Defined Terms. Capitalized terms not specifically defined herein shall have the meanings specified in the Plan and the Grant Notice.

1.2 Incorporation of Terms of Plan. The Option is subject to the terms and conditions of the Plan which are incorporated herein by reference. In the event of any inconsistency between the Plan and this Agreement, the terms of the Plan shall control.

ARTICLE 2.

GRANT OF OPTION

2.1 Grant of Option. In consideration of Participant’s past and/or continued employment with or service to the Company or any Subsidiary and for other good and valuable consideration, effective as of the Grant Date set forth in the Grant Notice (the “Grant Date”), the Company irrevocably grants to Participant the Option to purchase any part or all of an aggregate of the number of Shares set forth in the Grant Notice, upon the terms and conditions set forth in the Plan and this Agreement, subject to adjustments as provided in Article IX of the Plan. Unless designated as a Nonqualified Stock Option in the Grant Notice, the Option shall be an Incentive Stock Option to the maximum extent permitted by law.

2.2 Exercise Price. The exercise price of the Shares subject to the Option shall be as set forth in the Grant Notice, without commission or other charge; *provided, however*, that the price per share of the Shares subject to the Option shall not be less than 100% of the Fair Market Value of a Share on the Grant Date. Notwithstanding the foregoing, if this Option is designated as an Incentive Stock Option and Participant is a Greater Than 10% Stockholder as of the Grant Date, the exercise price per share of the Shares subject to the Option shall not be less than 110% of the Fair Market Value of a Share on the Grant Date.

2.3 Consideration to the Company. In consideration of the grant of the Option by the Company, Participant agrees to render faithful and efficient services to the Company or any Subsidiary. Nothing in the Plan or this Agreement shall confer upon Participant any right to continue in the employ or service of the Company or any Subsidiary or shall interfere with or restrict in any way the rights of the Company and its Subsidiaries, which rights are hereby expressly reserved, to discharge or terminate the services of Participant at any time for any reason whatsoever, with or without cause, except to the extent expressly provided otherwise in a written agreement between the Company or a Subsidiary and Participant.

ARTICLE 3.

PERIOD OF EXERCISABILITY

3.1 Commencement of Exercisability.

(a) Subject to Sections 3.2, 3.3, 5.11 and 5.17 hereof, the Option shall become vested and exercisable in such amounts and at such times as are set forth in the Grant Notice.

(b) No portion of the Option which has not become vested and exercisable at the date of Participant's Termination of Service shall thereafter become vested and exercisable, except as may be otherwise provided by the Administrator or as set forth in a written agreement between the Company and Participant.

(c) Notwithstanding Section 3.1(a) hereof and the Grant Notice, but subject to Section 3.1(b) hereof, in the event of a Change in Control the Option shall be treated pursuant to Sections 9.2 and 9.3 of the Plan.

3.2 Duration of Exercisability. The installments provided for in the vesting schedule set forth in the Grant Notice are cumulative. Each such installment which becomes vested and exercisable pursuant to the vesting schedule set forth in the Grant Notice shall remain vested and exercisable until it becomes unexercisable under Section 3.3 hereof.

3.3 Expiration of Option. The Option may not be exercised to any extent by anyone after the first to occur of the following events:

(a) The Expiration Date set forth in the Grant Notice, which shall in no event be more than ten (10) years from the Grant Date;

(b) If this Option is designated as an Incentive Stock Option and Participant, at the time the Option was granted, was a Greater Than 10% Stockholder, the expiration of five (5) years from the Grant Date;

(c) The expiration of three (3) months from the date of Participant's Termination of Service, unless such termination occurs by reason of Participant's death or Disability; or

(d) The expiration of one (1) year from the date of Participant's Termination of Service by reason of Participant's death or Disability.

3.4 Special Tax Consequences. Participant acknowledges that, to the extent that the aggregate Fair Market Value (determined as of the time the Option is granted) of all Shares with respect to which Incentive Stock Options, including the Option (if applicable), are exercisable for the first time by Participant in any calendar year exceeds \$100,000, the Option and such other options shall be Nonqualified Stock Options to the extent necessary to comply with the limitations imposed by Section 422(d) of the Code. Participant further acknowledges that the rule set forth in the preceding sentence shall be applied by taking the Option and other "incentive stock options" into account in the order in which they were granted, as determined under Section 422(d) of the Code and the Treasury Regulations thereunder. Participant also acknowledges that an Incentive Stock Option exercised more than three (3) months after Participant's Termination of Employment, other than by reason of death or Disability, will be taxed as a Nonqualified Stock Option.

3.5 Tax Indemnity.

(a) Participant agrees to indemnify and keep indemnified the Company, any Subsidiary and Participant's employing company, if different, from and against any liability for or obligation to pay any Tax Liability (a "Tax Liability" being any liability for income tax, withholding tax and any other employment related taxes or social security contributions in any jurisdiction) that is attributable to (1) the grant or exercise of, or any benefit derived by Participant from, the Option, (2) the acquisition by Participant of the Shares on exercise of the Option or (3) the disposal of any Shares.

(b) The Option cannot be exercised until Participant has made such arrangements as the Company may require for the satisfaction of any Tax Liability that may arise in connection with the exercise of the Option and/or the acquisition of the Shares by Participant. The Company shall not be required to issue, allot or transfer Shares until Participant has satisfied this obligation.

(c) Participant hereby acknowledges that the Company (i) makes no representations or undertakings regarding the treatment of any Tax Liabilities in connection with any aspect of the Option and (ii) does not commit to and is under no obligation to structure the terms of the grant or any aspect of any Award, including the Option, to reduce or eliminate Participant's liability for Tax Liabilities or achieve any particular tax result. Furthermore, if Participant becomes subject to tax in more than one jurisdiction between the date of grant of an Award, including the Option, and the date of any relevant taxable event, Participant acknowledges that the Company may be required to withhold or account for Tax Liabilities in more than one jurisdiction.

ARTICLE 4.

EXERCISE OF OPTION

4.1 Person Eligible to Exercise. Except as provided in Section 5.3 hereof, during the lifetime of Participant, only Participant may exercise the Option or any portion thereof, unless it has been disposed of pursuant to a DRO. After the death of Participant, any exercisable portion of the Option may, prior to the time when the Option becomes unexercisable under Section 3.3 hereof, be exercised by the deceased Participant's personal representative or by any person empowered to do so under the deceased Participant's will or under the then applicable laws of descent and distribution.

4.2 Partial Exercise. Any exercisable portion of the Option or the entire Option, if then wholly exercisable, may be exercised in whole or in part at any time prior to the time when the Option or portion thereof becomes unexercisable under Section 3.3 hereof. However, the Option shall not be exercisable with respect to fractional Shares.

4.3 Manner of Exercise. The Option, or any exercisable portion thereof, may be exercised solely by delivery to the Secretary of the Company (or any third party administrator or other person or entity designated by the Company; for the avoidance of doubt, delivery shall include electronic delivery), during regular business hours, of all of the following prior to the time when the Option or such portion thereof becomes unexercisable under Section 3.3 hereof:

(a) An exercise notice in a form specified by the Administrator, stating that the Option or portion thereof is thereby exercised, such notice complying with all applicable rules established by the Administrator. The notice shall be signed by Participant or other person then entitled to exercise the Option or such portion of the Option;

(b) The receipt by the Company of full payment for the Shares with respect to which the Option or portion thereof is exercised, including payment of any applicable withholding tax, which shall be made by deduction from other compensation payable to Participant or in such other form of consideration permitted under Section 4.4 hereof that is acceptable to the Company;

(c) Any other written representations or documents as may be required in the Administrator's sole discretion to evidence compliance with the Securities Act, the Exchange Act or any other applicable law, rule or regulation; and

(d) In the event the Option or portion thereof shall be exercised pursuant to Section 4.1 hereof by any person or persons other than Participant, appropriate proof of the right of such person or persons to exercise the Option.

Notwithstanding any of the foregoing, the Company shall have the right to specify all conditions of the manner of exercise, which conditions may vary by country and which may be subject to change from time to time.

4.4 Method of Payment. Payment of the exercise price shall be by any of the following, or a combination thereof, at the election of Participant:

(a) Cash or check;

(b) With the consent of the Administrator, surrender of Shares (including, without limitation, Shares otherwise issuable upon exercise of the Option) held for such period of time as may be required by the Administrator in order to avoid adverse accounting consequences and having a Fair Market Value on the date of delivery equal to the aggregate exercise price of the Option or exercised portion thereof; or

(c) Other legal consideration acceptable to the Administrator (including, without limitation, through the delivery of a notice that Participant has placed a market sell order with a broker with respect to Shares then issuable upon exercise of the Option, and that the broker has been directed to pay a sufficient portion of the net proceeds of the sale to the Company in satisfaction of the Option exercise price; *provided* that payment of such proceeds is then made to the Company at such time as may be required by the Company, but in any event not later than the settlement of such sale).

4.5 Conditions to Issuance of Shares. The Shares deliverable upon the exercise of the Option, or any portion thereof, may be either previously authorized but unissued Shares or issued Shares which have then been reacquired by the Company. Such Shares shall be fully paid and nonassessable. The Company shall not be required to issue or deliver any Shares purchased upon the exercise of the Option or portion thereof prior to fulfillment of all of the conditions in Section 10.7 of the Plan and following conditions:

(a) The admission of such Shares to listing on all stock exchanges on which such Shares are then listed;

(b) The completion of any registration or other qualification of such Shares under any state or federal law or under rulings or regulations of the Securities and Exchange Commission or of any other governmental regulatory body, which the Administrator shall, in its absolute discretion, deem necessary or advisable;

(c) The obtaining of any approval or other clearance from any state or federal governmental agency which the Administrator shall, in its absolute discretion, determine to be necessary or advisable;

(d) The receipt by the Company of full payment for such Shares, including payment of any applicable withholding tax, which may be in one or more of the forms of consideration permitted under Section 4.4 hereof; and

(e) The lapse of such reasonable period of time following the exercise of the Option as the Administrator may from time to time establish for reasons of administrative convenience.

4.6 Rights as Stockholder. The holder of the Option shall not be, nor have any of the rights or privileges of, a stockholder of the Company, including, without limitation, voting rights and rights to dividends, in respect of any Shares purchasable upon the exercise of any part of the Option unless and until such Shares shall have been issued by the Company and held of record by such holder (as evidenced by the appropriate entry on the books of the Company or of a duly authorized transfer agent of the Company). No adjustment will be made for a dividend or other right for which the record date is prior to the date the Shares are issued, except as provided in Article IX of the Plan.

ARTICLE 5.

OTHER PROVISIONS

5.1 Administration. The Administrator shall have the power to interpret the Plan and this Agreement and to adopt such rules for the administration, interpretation and application of the Plan as are consistent therewith and to interpret, amend or revoke any such rules. All actions taken and all interpretations and determinations made by the Administrator in good faith shall be final and binding upon Participant, the Company and all other interested persons. No member of the Committee or the Board shall be personally liable for any action, determination or interpretation made in good faith with respect to the Plan, this Agreement or the Option.

5.2 Whole Shares. The Option may only be exercised for whole Shares.

5.3 Option Not Transferable.

(a) Subject to Section 4.1 hereof, the Option may not be sold, pledged, assigned or transferred in any manner other than by will or the laws of descent and distribution or, subject to the consent of the Administrator, pursuant to a DRO, unless and until the Option has been exercised and the Shares underlying the Option have been issued, and all restrictions applicable to such Shares have lapsed. Neither the Option nor any interest or right therein shall be liable for the debts, contracts or engagements of Participant or his or her successors in interest or shall be subject to disposition by transfer, alienation, anticipation, pledge, hypothecation, encumbrance, assignment or any other means whether such disposition be voluntary or involuntary or by operation of law by judgment, levy, attachment, garnishment or any other legal or equitable proceedings (including bankruptcy) unless and until the Option has been exercised, and any attempted disposition thereof prior to exercise shall be null and void and of no effect, except to the extent that such disposition is permitted by the preceding sentence.

(b) During the lifetime of Participant, only Participant may exercise the Option (or any portion thereof), unless it has been disposed of pursuant to a DRO; after the death of Participant, any exercisable portion of the Option may, prior to the time when such portion becomes unexercisable under the Plan or this Agreement, be exercised by Participant's personal representative or by any person empowered to do so under the deceased Participant's will or under the then-applicable laws of descent and distribution.

(c) Notwithstanding any other provision in this Agreement, Participant may, in the manner determined by the Administrator, designate a beneficiary to exercise the rights of Participant and to receive any distribution with respect to the Option upon Participant's death. A beneficiary, legal guardian, legal representative, or other person claiming any rights pursuant to the Plan is subject to all terms and conditions of the Plan and this Agreement, except to the extent the Plan and this Agreement otherwise provide, and to any additional restrictions deemed necessary or appropriate by the Administrator. If Participant is married or a domestic partner in a domestic partnership qualified under Applicable Law and resides in a community property state, a designation of a person other than Participant's spouse or domestic partner, as applicable, as his or her beneficiary with respect to more than 50% of Participant's interest in the Option shall not be effective without the prior written consent of Participant's spouse or domestic partner. If no beneficiary has been designated or survives Participant, payment shall be made to the person entitled thereto pursuant to Participant's will or the laws of descent and distribution. Subject to the foregoing, a beneficiary designation may be changed or revoked by Participant at any time provided the change or revocation is filed with the Administrator prior to Participant's death.

5.4 Tax Consultation. Participant understands that Participant may suffer adverse tax consequences as a result of the grant, vesting and/or exercise of the Option, and/or with the purchase or disposition of the Shares subject to the Option. Participant represents that Participant has consulted with any tax consultants Participant deems advisable in connection with the purchase or disposition of such Shares and that Participant is not relying on the Company for any tax advice.

5.5 Binding Agreement. Subject to the limitation on the transferability of the Option contained herein, this Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto.

5.6 Adjustments Upon Specified Events. The Administrator may accelerate the vesting of the Option in such circumstances as it, in its sole discretion, may determine. In addition, upon the occurrence of certain events relating to the Shares contemplated by Article IX of the Plan (including, without limitation, an extraordinary cash dividend on such Shares), the Administrator shall make such adjustments the Administrator deems appropriate in the number of Shares subject to the Option, the exercise price of the Option and the kind of securities that may be issued upon exercise of the Option. Participant acknowledges that the Option is subject to adjustment, modification and termination in certain events as provided in this Agreement and Article IX of the Plan.

5.7 Notices. Any notice to be given under the terms of this Agreement to the Company shall be addressed to the Company in care of the Secretary of the Company at the Company's principal office, and any notice to be given to Participant shall be addressed to Participant at Participant's last address reflected on the Company's records. By a notice given pursuant to this Section 5.7, either party may hereafter designate a different address for notices to be given to that party. Any notice which is required to be given to Participant shall, if Participant is then deceased, be given to the person entitled to exercise his or her Option pursuant to Section 4.1 hereof by written notice under this Section 5.7. Any notice shall be deemed duly given when sent via email or when sent by certified mail (return receipt requested) and deposited (with postage prepaid) in a post office or branch post office regularly maintained by the United States Postal Service.

5.8 Titles. Titles are provided herein for convenience only and are not to serve as a basis for interpretation or construction of this Agreement.

5.9 Governing Law. The laws of the State of Delaware shall govern the interpretation, validity, administration, enforcement and performance of the terms of this Agreement regardless of the law that might be applied under principles of conflicts of laws.

5.10 Conformity to Securities Laws. Participant acknowledges that the Plan and this Agreement are intended to conform to the extent necessary with all provisions of the Securities Act and the Exchange Act and any and all Applicable Law and regulations and rules promulgated by the Securities and Exchange Commission thereunder, and state securities laws and regulations. Notwithstanding anything herein to the contrary, the Plan shall be administered, and the Option is granted and may be exercised, only in such a manner as to conform to such Applicable Law. To the extent permitted by applicable law, the Plan and this Agreement shall be deemed amended to the extent necessary to conform to such Applicable Law.

5.11 Amendment, Suspension and Termination. To the extent permitted by the Plan, this Agreement may be wholly or partially amended or otherwise modified, suspended or terminated at any time or from time to time by the Administrator or the Board; *provided, however*, that, except as may otherwise be provided by the Plan, no amendment, modification, suspension or termination of this Agreement shall adversely affect the Option in any material way without the prior written consent of Participant.

5.12 Successors and Assigns. The Company may assign any of its rights under this Agreement to single or multiple assignees, and this Agreement shall inure to the benefit of the successors and assigns of the Company. Subject to the restrictions on transfer herein set forth in Section 5.3 hereof, this Agreement shall be binding upon Participant and his or her heirs, executors, administrators, successors and assigns.

5.13 Notification of Disposition. If this Option is designated as an Incentive Stock Option, Participant shall give prompt notice to the Company of any disposition or other transfer of any Shares acquired under this Agreement if such disposition or transfer is made (a) within two (2) years from the Grant Date with respect to such Shares or (b) within one (1) year after the transfer of such Shares to Participant. Such notice shall specify the date of such disposition or other transfer and the amount realized, in cash, other property, assumption of indebtedness or other consideration, by Participant in such disposition or other transfer.

5.14 Limitations Applicable to Section 16 Persons. Notwithstanding any other provision of the Plan or this Agreement, if Participant is subject to Section 16 of the Exchange Act, the Plan, the Option and this Agreement shall be subject to any additional limitations set forth in any applicable exemptive rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3 of the Exchange Act) that are requirements for the application of such exemptive rule. To the extent permitted by applicable law, this Agreement shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

5.15 Not a Contract of Service Relationship. Nothing in this Agreement or in the Plan shall confer upon Participant any right to continue to serve as an employee or other service provider of the Company or any of its Subsidiaries or interfere with or restrict in any way with the right of the Company or any of its Subsidiaries, which rights are hereby expressly reserved, to discharge or to terminate for any reason whatsoever, with or without cause, the services of Participant's at any time.

5.16 Entire Agreement. The Plan, the Grant Notice and this Agreement constitute the entire agreement of the parties and supersede in their entirety all prior undertakings and agreements of the Company and Participant with respect to the subject matter hereof.

5.17 Section 409A. This Option is not intended to constitute “nonqualified deferred compensation” within the meaning of Section 409A of the Code (together with any Department of Treasury regulations and other interpretive guidance issued thereunder, including without limitation any such regulations or other guidance that may be issued after the date hereof, “Section 409A”). However, notwithstanding any other provision of the Plan, the Grant Notice or this Agreement, if at any time the Administrator determines that the Option (or any portion thereof) may be subject to Section 409A, the Administrator shall have the right in its sole discretion (without any obligation to do so or to indemnify Participant or any other person for failure to do so) to adopt such amendments to the Plan, the Grant Notice or this Agreement, or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions, as the Administrator determines are necessary or appropriate either for the Option to be exempt from the application of Section 409A or to comply with the requirements of Section 409A.

5.18 Limitation on Participant’s Rights. Participation in the Plan confers no rights or interests other than as herein provided. This Agreement creates only a contractual obligation on the part of the Company as to amounts payable and shall not be construed as creating a trust. Neither the Plan nor any underlying program, in and of itself, has any assets. Participant shall have only the rights of a general unsecured creditor of the Company with respect to amounts credited and benefits payable, if any, with respect to the Option, and rights no greater than the right to receive the Shares as a general unsecured creditor with respect to options, as and when exercised pursuant to the terms hereof.

* * * * *

**4D MOLECULAR THERAPEUTICS, INC.
2020 INCENTIVE AWARD PLAN
RESTRICTED STOCK AWARD GRANT NOTICE**

4D Molecular Therapeutics, Inc., a Delaware corporation, (the “Company”), pursuant to its 2020 Incentive Award Plan, as amended from time to time (the “Plan”), hereby grants to the holder listed below (the “Participant”) the number of shares of the Company’s Common Stock set forth below (the “Shares”) subject to all of the terms and conditions as set forth herein and in the Restricted Stock Award Agreement attached hereto as Exhibit A (the “Agreement”) (including without limitation the Restrictions on the Shares set forth in the Agreement) and the Plan, each of which is incorporated herein by reference. Unless otherwise defined herein, the terms defined in the Plan shall have the same defined meanings in this Restricted Stock Award Grant Notice (the “Grant Notice”) and the Agreement.

Participant: [_____]

Grant Date: [_____]

Total Number of Shares of Restricted Stock: [_____]

Vesting Commencement Date: [_____]

Vesting Schedule: [_____]

Termination: If the Participant experiences a Termination of Service, any Shares that have not become vested on or prior to the date of such Termination of Service will thereupon be automatically forfeited by the Participant, and the Participant’s rights in such Shares shall thereupon lapse and expire.

By his or her signature and the Company’s signature below, the Participant agrees to be bound by the terms and conditions of the Plan, the Agreement and this Grant Notice. The Participant has reviewed the Agreement, the Plan and this Grant Notice in their entirety, has had an opportunity to obtain the advice of counsel prior to executing this Grant Notice and fully understands all provisions of this Grant Notice, the Agreement and the Plan. The Participant hereby agrees to accept as binding, conclusive and final all decisions or interpretations of the Administrator upon any questions arising under the Plan, this Grant Notice or the Agreement. In addition, by signing below, the Participant also agrees that the Company, in its sole discretion, may satisfy any withholding obligations in accordance with Section 2.2(c) of the Agreement by (i) withholding shares of Common Stock otherwise issuable to the Participant upon vesting of the Shares, (ii) instructing a broker on the Participant’s behalf to sell Shares upon vesting and submit the proceeds of such sale to the Company, or (iii) using any other method permitted by Section 2.2(c) of the Agreement or the Plan.

4D MOLECULAR THERAPEUTICS, INC.:

PARTICIPANT:

By: _____
 Print Name: _____
 Title: _____
 Address: _____

By: _____
 Print Name: _____
 Address: _____

**EXHIBIT A
TO RESTRICTED STOCK AWARD GRANT NOTICE**

RESTRICTED STOCK AWARD AGREEMENT

Pursuant to the Restricted Stock Award Grant Notice (the "Grant Notice") to which this Restricted Stock Award Agreement (this "Agreement") is attached, 4D Molecular Therapeutics, Inc., a Delaware corporation, (the "Company") has granted to the Participant the number of shares of Restricted Stock (the "Shares") under the Company's 2020 Incentive Award Plan, as amended from time to time (the "Plan"), as set forth in the Grant Notice.

ARTICLE I.

GENERAL

1.1 Defined Terms. Capitalized terms not specifically defined herein shall have the meanings specified in the Plan and Grant Notice.

1.2 Incorporation of Terms of Plan. The Award (as defined below) is subject to the terms and conditions of the Plan, which are incorporated herein by reference. In the event of any inconsistency between the Plan and this Agreement, the terms of the Plan shall control.

ARTICLE II.

AWARD OF RESTRICTED STOCK

2.1 Award of Restricted Stock.

(a) Award. Pursuant to the Grant Notice and upon the terms and conditions set forth in the Plan and this Agreement, effective as of the Grant Date set forth in the Grant Notice, the Company has granted to the Participant an award of Restricted Stock (the "Award") under the Plan in consideration of the Participant's past and/or continued employment with or service to the Company or any Subsidiary, and for other good and valuable consideration. The number of Shares subject to the Award is set forth in the Grant Notice. The Participant is an Employee, Director or Consultant of the Company or one of its Subsidiaries.

(b) Escrow. The Participant, by acceptance of the Award, shall be deemed to appoint, and does so appoint, the Secretary of the Company or such other escrow holder as the Administrator may appoint to hold the Shares in escrow as the Participant's attorney(s)-in-fact to effect any transfer of unvested forfeited Shares (or Shares otherwise reacquired by the Company hereunder) to the Company as may be required pursuant to the Plan or this Agreement and to execute such documents as the Company or such representatives deem necessary or advisable in connection with any such transfer.

(c) Removal of Notations. As soon as administratively practicable after the vesting of any Shares subject to the Award pursuant to Section 2.2(b) hereof, the Company shall remove the notations on any Shares subject to the Award which have vested (or such lesser number of Shares as may be permitted pursuant to Section 10.7 of the Plan). The Participant (or the beneficiary or personal representative of the Participant in the event of the Participant's death or incapacity, as the case may be) shall deliver to the Company any representations or other documents or assurances required by the Company.

2.2 Restrictions.

(a) Forfeiture. Notwithstanding any contrary provision of this Agreement, upon the Participant's Termination of Service for any or no reason, any Shares subject to Restrictions shall thereupon be forfeited immediately and without any further action by the Company, and the Participant's rights in such Shares shall thereupon lapse and expire.

(b) Vesting and Lapse of Restrictions. As of the Grant Date, one hundred percent (100%) of the Shares shall be subject to a risk of forfeiture and the transfer restrictions set forth in Section 3.3 hereof (collectively, such risk of forfeiture and such transfer restrictions, the "Restrictions"). The Award shall vest and Restrictions shall lapse in accordance with the vesting schedule set forth in the Grant Notice (rounding down to the nearest whole Share).

(c) Tax Withholding. As set forth in Section 10.5 of the Plan, the Company shall have the authority and the right to deduct or withhold, or to require the Participant to remit to the Company, an amount sufficient to satisfy all applicable federal, state and local taxes required by law to be withheld with respect to any taxable event arising in connection with the Award. The Company shall not be obligated to transfer Shares held in escrow to the Participant or the Participant's legal representative until the Participant or the Participant's legal representative shall have paid or otherwise satisfied in full the amount of all federal, state and local taxes applicable to the taxable income of the Participant resulting from the grant or vesting of the Award or the issuance of Shares.

(d) Stop Transfer Instructions. To ensure compliance with the Restrictions, the provisions of the charter documents of the Company, and/or Applicable Law and for other proper purposes, the Company may issue appropriate "stop transfer" and other instructions to its transfer agent with respect to the Restricted Stock. The Company shall notify the transfer agent as and when the Restrictions lapse.

2.3 Consideration to the Company. In consideration of the grant of the Award pursuant hereto, the Participant agrees to render faithful and efficient services to the Company or any Subsidiary.

ARTICLE III.

OTHER PROVISIONS

3.1 Section 83(b) Election. If the Participant makes an election under Section 83(b) of the Code to be taxed with respect to the Restricted Stock as of the date of transfer of the Restricted Stock rather than as of the date or dates upon which the Participant would otherwise be taxable under Section 83(a) of the Code, the Participant hereby agrees to deliver a copy of such election to the Company promptly after filing such election with the Internal Revenue Service.

3.2 Administration. The Administrator shall have the power to interpret the Plan and this Agreement and to adopt such rules for the administration, interpretation and application of the Plan as are consistent therewith and to interpret, amend or revoke any such rules. All actions taken and all interpretations and determinations made by the Administrator in good faith shall be final and binding upon the Participant, the Company and all other interested persons. No member of the Administrator or the Board shall be personally liable for any action, determination or interpretation made in good faith with respect to the Plan, this Agreement or the Award.

3.3 Restricted Stock Not Transferable. Until the Restrictions hereunder lapse or expire pursuant to this Agreement and the Shares vest, the Restricted Stock (including any Shares or other securities or property received by the Participant with respect to Restricted Stock as a result of stock dividends, stock splits or any other form of recapitalization) shall be subject to the restrictions on transferability set forth in Section 10.1 of the Plan.

3.4 Rights as Stockholder. Except as otherwise provided herein, upon the Grant Date, the Participant shall have all the rights of a stockholder of the Company with respect to the Shares, subject to the Restrictions, including, without limitation, voting rights and rights to receive any cash or stock dividends, in respect of the Shares subject to the Award and deliverable hereunder.

3.5 Tax Consultation. The Participant understands that the Participant may suffer adverse tax consequences in connection with the Restricted Stock granted pursuant to this Agreement (and the Shares issuable with respect thereto). The Participant represents that the Participant has consulted with any tax consultants the Participant deems advisable in connection with the Restricted Stock and that the Participant is not relying on the Company for any tax advice.

3.6 Adjustments Upon Specified Events. The Administrator may accelerate the vesting of the Restricted Stock in such circumstances as it, in its sole discretion, may determine. The Participant acknowledges that the Restricted Stock is subject to adjustment, modification and termination in certain events as provided in this Agreement and Article IX of the Plan.

3.7 Notices. Any notice to be given under the terms of this Agreement to the Company shall be addressed to the Company in care of the Secretary of the Company at the Company's principal office, and any notice to be given to the Participant shall be addressed to the Participant at the Participant's last address reflected on the Company's records. By a notice given pursuant to this Section 3.7, either party may hereafter designate a different address for notices to be given to that party. Any notice shall be deemed duly given when sent via email or when sent by certified mail (return receipt requested) and deposited (with postage prepaid) in a post office or branch post office regularly maintained by the United States Postal Service.

3.8 Participant's Representations. If the Shares issuable hereunder have not been registered under the Securities Act or any applicable state laws on an effective registration statement at the time of such issuance, the Participant shall, if required by the Company, concurrently with such issuance, make such written representations as are deemed necessary or appropriate by the Company and/or its counsel.

3.9 Titles. Titles are provided herein for convenience only and are not to serve as a basis for interpretation or construction of this Agreement.

3.10 Governing Law. The laws of the State of Delaware shall govern the interpretation, validity, administration, enforcement and performance of the terms of this Agreement regardless of the law that might be applied under principles of conflicts of laws.

3.11 Conformity to Securities Laws. The Participant acknowledges that the Plan and this Agreement are intended to conform to the extent necessary with all provisions of the Securities Act and the Exchange Act, and any and all Applicable Law. Notwithstanding anything herein to the contrary, the Plan shall be administered, and the Award is granted, only in such a manner as to conform to such Applicable Law. To the extent permitted by Applicable Law, the Plan and this Agreement shall be deemed amended to the extent necessary to conform to such Applicable Law.

3.12 Amendment, Suspension and Termination. To the extent permitted by the Plan, this Agreement may be wholly or partially amended or otherwise modified, suspended or terminated at any time or from time to time by the Administrator or the Board; *provided, however*, that, except as may otherwise be provided by the Plan, no amendment, modification, suspension or termination of this Agreement shall adversely affect the Award in any material way without the prior written consent of the Participant.

3.13 Successors and Assigns. The Company or any Subsidiary may assign any of its rights under this Agreement to single or multiple assignees, and this Agreement shall inure to the benefit of the successors and assigns of the Company and its Subsidiaries. Subject to the restrictions on transfer set forth in Section 3.3 hereof, this Agreement shall be binding upon the Participant and his or her heirs, executors, administrators, successors and assigns.

3.14 Limitations Applicable to Section 16 Persons. Notwithstanding any other provision of the Plan or this Agreement, if the Participant is subject to Section 16 of the Exchange Act, then the Plan, the Award and this Agreement shall be subject to any additional limitations set forth in any applicable exemptive rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3 of the Exchange Act) that are requirements for the application of such exemptive rule. To the extent permitted by applicable law, this Agreement shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

3.15 Not a Contract of Service Relationship. Nothing in this Agreement or in the Plan shall confer upon the Participant any right to continue to serve as an Employee or other service provider of the Company or any of its Subsidiaries or shall interfere with or restrict in any way the rights of the Company and its Subsidiaries, which rights are hereby expressly reserved, to discharge or terminate the services of the Participant at any time for any reason whatsoever, with or without cause, except to the extent expressly provided otherwise in a written agreement between the Company or a Subsidiary and the Participant.

3.16 Entire Agreement. The Plan, the Grant Notice and this Agreement (including all Exhibits thereto, if any) constitute the entire agreement of the parties and supersede in their entirety all prior undertakings and agreements of the Company and its Subsidiaries and the Participant with respect to the subject matter hereof.

3.17 Limitation on the Participant's Rights. Participation in the Plan confers no rights or interests other than as herein provided. This Agreement creates only a contractual obligation on the part of the Company as to amounts payable and shall not be construed as creating a trust. Neither the Plan nor any underlying program, in and of itself, has any assets. The Participant shall have only the rights of a general unsecured creditor of the Company and its Subsidiaries with respect to amounts credited and benefits payable, if any, with respect to the Shares issuable hereunder.

**4D MOLECULAR THERAPEUTICS, INC.
2020 INCENTIVE AWARD PLAN
RESTRICTED STOCK UNIT AWARD GRANT NOTICE**

4D Molecular Therapeutics, Inc., a Delaware corporation, (the "Company"), pursuant to its 2020 Incentive Award Plan, as amended from time to time (the "Plan"), hereby grants to the holder listed below (the "Participant"), an award of restricted stock units ("Restricted Stock Units" or "RSUs"). Each vested Restricted Stock Unit represents the right to receive, in accordance with the Restricted Stock Unit Award Agreement attached hereto as Exhibit A (the "Agreement"), one share of Common Stock ("Share"). This award of Restricted Stock Units is subject to all of the terms and conditions set forth herein and in the Agreement and the Plan, each of which are incorporated herein by reference. Unless otherwise defined herein, the terms defined in the Plan shall have the same defined meanings in this Restricted Stock Unit Award Grant Notice (the "Grant Notice") and the Agreement.

Participant: _____

Grant Date: _____

Total Number of RSUs: _____

Vesting Commencement Date: _____

Vesting Schedule: _____

Termination: If the Participant experiences a Termination of Service, all RSUs that have not become vested on or prior to the date of such Termination of Service will thereupon be automatically forfeited by the Participant without payment of any consideration therefor.

By his or her signature and the Company's signature below, the Participant agrees to be bound by the terms and conditions of the Plan, the Agreement and this Grant Notice. The Participant has reviewed the Agreement, the Plan and this Grant Notice in their entirety, has had an opportunity to obtain the advice of counsel prior to executing this Grant Notice and fully understands all provisions of this Grant Notice, the Agreement and the Plan. The Participant hereby agrees to accept as binding, conclusive and final all decisions or interpretations of the Administrator upon any questions arising under the Plan, this Grant Notice or the Agreement. In addition, by signing below, the Participant also agrees that the Company, in its sole discretion, may satisfy any withholding obligations in accordance with Section 2.6(b) of the Agreement by (i) withholding shares of Common Stock otherwise issuable to the Participant upon vesting of the RSUs, (ii) instructing a broker on the Participant's behalf to sell shares of Common Stock otherwise issuable to the Participant upon vesting of the RSUs and submit the proceeds of such sale to the Company, or (iii) using any other method permitted by Section 2.6(b) of the Agreement or the Plan.

4D MOLECULAR THERAPEUTICS, INC.:

By: _____
Print Name: _____
Title: _____
Address: _____

PARTICIPANT:

By: _____
Print Name: _____
Address: _____

**EXHIBIT A
TO RESTRICTED STOCK UNIT AWARD GRANT NOTICE**

RESTRICTED STOCK UNIT AWARD AGREEMENT

Pursuant to the Restricted Stock Unit Award Grant Notice (the “Grant Notice”) to which this Restricted Stock Unit Award Agreement (this “Agreement”) is attached, 4D Molecular Therapeutics, Inc., a Delaware corporation (the “Company”), has granted to the Participant the number of restricted stock units (“Restricted Stock Units” or “RSUs”) set forth in the Grant Notice under the Company’s 2020 Incentive Award Plan, as amended from time to time (the “Plan”). Each Restricted Stock Unit represents the right to receive one share of Common Stock (a “Share”) upon vesting.

ARTICLE I.

GENERAL

1.1 Defined Terms. Capitalized terms not specifically defined herein shall have the meanings specified in the Plan and Grant Notice.

1.2 Incorporation of Terms of Plan. The RSUs are subject to the terms and conditions of the Plan, which are incorporated herein by reference. In the event of any inconsistency between the Plan and this Agreement, the terms of the Plan shall control.

ARTICLE II.

GRANT OF RESTRICTED STOCK UNITS

2.1 Grant of RSUs. Pursuant to the Grant Notice and upon the terms and conditions set forth in the Plan and this Agreement, effective as of the Grant Date set forth in the Grant Notice, the Company hereby grants to the Participant an award of RSUs under the Plan in consideration of the Participant’s past and/or continued employment with or service to the Company or any Subsidiaries and for other good and valuable consideration.

2.2 Unsecured Obligation to RSUs. Unless and until the RSUs have vested in the manner set forth in Article 2 hereof, the Participant will have no right to receive Common Stock under any such RSUs. Prior to actual payment of any vested RSUs, such RSUs will represent an unsecured obligation of the Company, payable (if at all) only from the general assets of the Company.

2.3 Vesting Schedule. Subject to Section 2.5 hereof, the RSUs shall vest and become nonforfeitable with respect to the applicable portion thereof according to the vesting schedule set forth in the Grant Notice (rounding down to the nearest whole Share).

2.4 Consideration to the Company. In consideration of the grant of the award of RSUs pursuant hereto, the Participant agrees to render faithful and efficient services to the Company or any Subsidiary.

2.5 Forfeiture, Termination and Cancellation upon Termination of Service. Notwithstanding any contrary provision of this Agreement or the Plan, upon the Participant’s Termination of Service for any or no reason, all Restricted Stock Units which have not vested prior to or in connection with such Termination of Service shall thereupon automatically be forfeited, terminated and cancelled as of the applicable termination date without payment of any consideration by the Company, and the

Participant, or the Participant's beneficiary or personal representative, as the case may be, shall have no further rights hereunder. No portion of the RSUs which has not become vested as of the date on which the Participant incurs a Termination of Service shall thereafter become vested.

2.6 Issuance of Common Stock upon Vesting.

(a) As soon as administratively practicable following the vesting of any Restricted Stock Units pursuant to Section 2.3 hereof, but in no event later than thirty (30) days after such vesting date (for the avoidance of doubt, this deadline is intended to comply with the "short term deferral" exemption from Section 409A of the Code), the Company shall deliver to the Participant (or any transferee permitted under Section 3.2 hereof) a number of Shares equal to the number of RSUs subject to this Award that vest on the applicable vesting date. Notwithstanding the foregoing, in the event Shares cannot be issued pursuant to Section 10.7 of the Plan, the Shares shall be issued pursuant to the preceding sentence as soon as administratively practicable after the Administrator determines that Shares can again be issued in accordance with such Section.

(b) As set forth in Section 10.5 of the Plan, the Company shall have the authority and the right to deduct or withhold, or to require the Participant to remit to the Company, an amount sufficient to satisfy all applicable federal, state and local taxes required by law to be withheld with respect to any taxable event arising in connection with the Restricted Stock Units. The Company shall not be obligated to deliver any Shares to the Participant or the Participant's legal representative unless and until the Participant or the Participant's legal representative shall have paid or otherwise satisfied in full the amount of all federal, state and local taxes applicable to the taxable income of the Participant resulting from the grant or vesting of the Restricted Stock Units or the issuance of Shares.

2.7 Conditions to Delivery of Shares. The Shares deliverable hereunder may be either previously authorized but unissued Shares, treasury Shares or issued Shares which have then been reacquired by the Company. Such Shares shall be fully paid and nonassessable. The Company shall not be required to issue Shares deliverable hereunder prior to fulfillment of the conditions set forth in Section 10.7 of the Plan.

2.8 Rights as Stockholder. The holder of the RSUs shall not be, nor have any of the rights or privileges of, a stockholder of the Company, including, without limitation, voting rights and rights to dividends, in respect of the RSUs and any Shares underlying the RSUs and deliverable hereunder unless and until such Shares shall have been issued by the Company and held of record by such holder (as evidenced by the appropriate entry on the books of the Company or of a duly authorized transfer agent of the Company). No adjustment shall be made for a dividend or other right for which the record date is prior to the date the Shares are issued, except as provided in Article IX of the Plan.

ARTICLE III.

OTHER PROVISIONS

3.1 Administration. The Administrator shall have the power to interpret the Plan and this Agreement and to adopt such rules for the administration, interpretation and application of the Plan as are consistent therewith and to interpret, amend or revoke any such rules. All actions taken and all interpretations and determinations made by the Administrator in good faith shall be final and binding upon the Participant, the Company and all other interested persons. No member of the Administrator or the Board shall be personally liable for any action, determination or interpretation made in good faith with respect to the Plan, this Agreement or the RSUs.

3.2 RSUs Not Transferable. The RSUs shall be subject to the restrictions on transferability set forth in Section 10.1 of the Plan.

3.3 Tax Consultation. The Participant understands that the Participant may suffer adverse tax consequences in connection with the RSUs granted pursuant to this Agreement (and the Shares issuable with respect thereto). The Participant represents that the Participant has consulted with any tax consultants the Participant deems advisable in connection with the RSUs and the issuance of Shares with respect thereto and that the Participant is not relying on the Company for any tax advice.

3.4 Binding Agreement. Subject to the limitation on the transferability of the RSUs contained herein, this Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto.

3.5 Adjustments Upon Specified Events. The Administrator may accelerate the vesting of the RSUs in such circumstances as it, in its sole discretion, may determine. The Participant acknowledges that the RSUs are subject to adjustment, modification and termination in certain events as provided in this Agreement and Article IX of the Plan.

3.6 Notices. Any notice to be given under the terms of this Agreement to the Company shall be addressed to the Company in care of the Secretary of the Company at the Company's principal office, and any notice to be given to the Participant shall be addressed to the Participant at the Participant's last address reflected on the Company's records. By a notice given pursuant to this Section 3.6, either party may hereafter designate a different address for notices to be given to that party. Any notice shall be deemed duly given when sent via email or when sent by certified mail (return receipt requested) and deposited (with postage prepaid) in a post office or branch post office regularly maintained by the United States Postal Service.

3.7 Participant's Representations. If the Shares issuable hereunder have not been registered under the Securities Act or any applicable state laws on an effective registration statement at the time of such issuance, the Participant shall, if required by the Company, concurrently with such issuance, make such written representations as are deemed necessary or appropriate by the Company and/or its counsel.

3.8 Titles. Titles are provided herein for convenience only and are not to serve as a basis for interpretation or construction of this Agreement.

3.9 Governing Law. The laws of the State of Delaware shall govern the interpretation, validity, administration, enforcement and performance of the terms of this Agreement regardless of the law that might be applied under principles of conflicts of laws.

3.10 Conformity to Securities Laws. The Participant acknowledges that the Plan and this Agreement are intended to conform to the extent necessary with all provisions of the Securities Act and the Exchange Act and any other Applicable Law. Notwithstanding anything herein to the contrary, the Plan shall be administered, and the RSUs are granted, only in such a manner as to conform to Applicable Law. To the extent permitted by Applicable Law, the Plan and this Agreement shall be deemed amended to the extent necessary to conform to such Applicable Law.

3.11 Amendment, Suspension and Termination. To the extent permitted by the Plan, this Agreement may be wholly or partially amended or otherwise modified, suspended or terminated at any time or from time to time by the Administrator or the Board; *provided, however*, that, except as may otherwise be provided by the Plan, no amendment, modification, suspension or termination of this Agreement shall adversely affect the RSUs in any material way without the prior written consent of the Participant.

3.12 Successors and Assigns. The Company may assign any of its rights under this Agreement to single or multiple assignees, and this Agreement shall inure to the benefit of the successors and assigns of the Company. Subject to the restrictions on transfer herein set forth in Section 3.2 hereof, this Agreement shall be binding upon the Participant and his or her heirs, executors, administrators, successors and assigns.

3.13 Limitations Applicable to Section 16 Persons. Notwithstanding any other provision of the Plan or this Agreement, if the Participant is subject to Section 16 of the Exchange Act, then the Plan, the RSUs and this Agreement shall be subject to any additional limitations set forth in any applicable exemptive rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3 of the Exchange Act) that are requirements for the application of such exemptive rule. To the extent permitted by Applicable Law, this Agreement shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

3.14 Not a Contract of Service Relationship. Nothing in this Agreement or in the Plan shall confer upon Participant any right to continue to serve as an employee or other service provider of the Company or any of its Subsidiaries or interfere with or restrict in any way with the right of the Company or any of its Subsidiaries, which rights are hereby expressly reserved, to discharge or to terminate for any reason whatsoever, with or without cause, the services of the Participant at any time.

3.15 Entire Agreement. The Plan, the Grant Notice and this Agreement (including all Exhibits thereto, if any) constitute the entire agreement of the parties and supersede in their entirety all prior undertakings and agreements of the Company and the Participant with respect to the subject matter hereof.

3.16 Section 409A. This Award is not intended to constitute “nonqualified deferred compensation” within the meaning of Section 409A of the Code (together with any Department of Treasury regulations and other interpretive guidance issued thereunder, including without limitation any such regulations or other guidance that may be issued after the date hereof, “Section 409A”). However, notwithstanding any other provision of the Plan, the Grant Notice or this Agreement, if at any time the Administrator determines that this Award (or any portion thereof) may be subject to Section 409A, the Administrator shall have the right in its sole discretion (without any obligation to do so or to indemnify Participant or any other person for failure to do so) to adopt such amendments to the Plan, the Grant Notice or this Agreement, or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions, as the Administrator determines are necessary or appropriate for this Award either to be exempt from the application of Section 409A or to comply with the requirements of Section 409A.

3.17 Limitation on Participant’s Rights. Participation in the Plan confers no rights or interests other than as herein provided. This Agreement creates only a contractual obligation on the part of the Company as to amounts payable and shall not be construed as creating a trust. Neither the Plan nor any underlying program, in and of itself, has any assets. The Participant shall have only the rights of a general unsecured creditor of the Company and its Subsidiaries with respect to amounts credited and benefits payable, if any, with respect to the RSUs, and rights no greater than the right to receive the Common Stock as a general unsecured creditor with respect to RSUs, as and when payable hereunder.

**4D MOLECULAR THERAPEUTICS, INC.
2020 EMPLOYEE STOCK PURCHASE PLAN**

**ARTICLE I.
PURPOSE**

The Plan's purpose is to assist employees of the Company and its Designated Subsidiaries in acquiring a stock ownership interest in the Company pursuant to a plan which is intended to qualify as an "employee stock purchase plan" under Section 423 of the Code, and to help such employees provide for their future security and to encourage them to remain in the employment of the Company and its Subsidiaries.

**ARTICLE II.
DEFINITIONS**

As used in the Plan, the following words and phrases have the meanings specified below, unless the context clearly indicates otherwise:

2.1 "**Administrator**" means the Committee, or such individuals to which authority to administer the Plan has been delegated under Section 7.1 hereof.

2.2 "**Agent**" means the brokerage firm, bank or other financial institution, entity or person(s), if any, engaged, retained, appointed or authorized to act as the agent of the Company or an Employee with regard to the Plan.

2.3 "**Board**" means the Board of Directors of the Company.

2.4 "**Code**" means the U.S. Internal Revenue Code of 1986, as amended, and all regulations, guidance, compliance programs and other interpretative authority issued thereunder.

2.5 "**Committee**" means the Compensation Committee of the Board.

2.6 "**Common Stock**" means the common stock of the Company.

2.7 "**Company**" means 4D Molecular Therapeutics, Inc., a Delaware corporation, or any successor.

2.8 "**Compensation**" of an Employee means the regular earnings or base salary, paid to the Employee from the Company on each Payday as compensation for services to the Company or any Designated Subsidiary, before deduction for any salary deferral contributions made by the Employee to any tax-qualified or nonqualified deferred compensation plan, including overtime, shift differentials, vacation pay, salaried production schedule premiums, holiday pay, jury duty pay, funeral leave pay, paid time off, military pay, and prior week adjustments, but excluding bonuses, commissions, education or tuition reimbursements, imputed income arising under any group insurance or benefit program, travel expenses, business and moving reimbursements, including tax gross ups and taxable mileage allowance, income received in connection with any stock options, restricted stock, restricted stock units or other compensatory equity awards and all contributions made by the Company or any Designated Subsidiary for the Employee's benefit under any employee benefit plan now or hereafter established. Such Compensation shall be calculated before deduction of any income or employment tax withholdings, but shall be withheld from the Employee's net income.

2.9 “**Designated Subsidiary**” means each Subsidiary that has been designated by the Board or Committee from time to time in its sole discretion as eligible to participate in the Plan, including any Subsidiary in existence on the Effective Date and any Subsidiary formed or acquired following the Effective Date, in accordance with Section 7.2 hereof.

2.10 “**Effective Date**” means the date immediately prior to the date the Company’s registration statement relating to its initial public offering becomes effective, *provided* that the Board has adopted the Plan prior to or on such date, subject to approval of the Plan by the Company’s stockholders in accordance with Section 7.7 hereof.

2.11 “**Eligible Employee**” means an Employee who:

(a) is customarily scheduled to work at least 20 hours per week;

(b) whose customary employment is more than five months in a calendar year; and

(c) after the granting of the Option would not be deemed for purposes of Section 423(b)(3) of the Code to possess five percent or more of the total combined voting power or value of all classes of stock of the Company or any Subsidiary.

For purposes of clause (c), the rules of Section 424(d) of the Code with regard to the attribution of stock ownership shall apply in determining the stock ownership of an individual, and stock which an Employee may purchase under outstanding options shall be treated as stock owned by the Employee.

Notwithstanding the foregoing, the Administrator may exclude from participation in the Plan as an Eligible Employee:

(x) any Employee that is a “highly compensated employee” of the Company or any Designated Subsidiary (within the meaning of Section 414(q) of the Code), or that is such a “highly compensated employee” (A) with compensation above a specified level, (B) who is an officer or (C) who is subject to the disclosure requirements of Section 16(a) of the Exchange Act; or

(y) any Employee who is a citizen or resident of a foreign jurisdiction (without regard to whether they are also a citizen of the United States or a resident alien (within the meaning of Section 7701(b)(1)(A) of the Code)) if either (A) the grant of the Option is prohibited under the laws of the jurisdiction governing such Employee, or (B) compliance with the laws of the foreign jurisdiction would cause the Plan or the Option to violate the requirements of Section 423 of the Code;

provided that any exclusion in clauses (x) or (y) shall be applied in an identical manner under each Offering Period to all Employees of the Company and all Designated Subsidiaries, in accordance with Treasury Regulation Section 1.423-2(e).

2.12 “**Employee**” means any person who renders services to the Company or a Designated Subsidiary in the status of an employee within the meaning of Section 3401(c) of the Code. “Employee” shall not include any director of the Company or a Designated Subsidiary who does not render services to the Company or a Designated Subsidiary in the status of an employee within the meaning of Section 3401(c) of the Code. For purposes of the Plan, the employment relationship shall be

treated as continuing intact while the individual is on military leave, sick leave or other leave of absence approved by the Company or a Designated Subsidiary and meeting the requirements of Treasury Regulation Section 1.421-1(h)(2). Where the period of leave exceeds three months, or such other period specified in Treasury Regulation Section 1.421-1(h)(2), and the individual's right to reemployment is not guaranteed either by statute or by contract, the employment relationship shall be deemed to have terminated on the first day immediately following such three-month period, or such other period specified in Treasury Regulation Section 1.421-1(h)(2).

2.13 "**Enrollment Date**" means the first date of each Offering Period.

2.14 "**Exercise Date**" means the last Trading Day of each Purchase Period, except as provided in Section 5.2 hereof.

2.15 "**Exchange Act**" means the Securities Exchange Act of 1934, as amended.

2.16 "**Fair Market Value**" means, as of any date, the value of Common Stock determined as follows:

(a) If the Common Stock is (i) listed on any established securities exchange (such as the New York Stock Exchange, the NASDAQ Global Market or the NASDAQ Global Select Market), (ii) listed on any national market system or (iii) listed, quoted or traded on any automated quotation system, its Fair Market Value shall be the closing sales price for a share of Common Stock as quoted on such exchange or system for such date or, if there is no closing sales price for a share of Common Stock on the date in question, the closing sales price for a share of Common Stock on the last preceding date for which such quotation exists, as reported in *The Wall Street Journal* or such other source as the Administrator deems reliable;

(b) If the Common Stock is not listed on an established securities exchange, national market system or automated quotation system, but the Common Stock is regularly quoted by a recognized securities dealer, its Fair Market Value shall be the mean of the high bid and low asked prices for such date or, if there are no high bid and low asked prices for a share of Common Stock on such date, the high bid and low asked prices for a share of Common Stock on the last preceding date for which such information exists, as reported in *The Wall Street Journal* or such other source as the Administrator deems reliable; or

(c) If the Common Stock is neither listed on an established securities exchange, national market system or automated quotation system nor regularly quoted by a recognized securities dealer, its Fair Market Value shall be established by the Administrator in good faith.

2.17 "**Grant Date**" means the first Trading Day of an Offering Period

2.18 "**New Exercise Date**" has the meaning set forth in Section 5.2(b) hereof.

2.19 "**Offering**" means an offer under the Plan of an Option that may be exercised during an Offering Period as further described in Section 4 hereof. Unless otherwise specified by the Administrator, each Offering to the Eligible Employees of the Company or a Designated Subsidiary shall be deemed a separate Offering, even if the dates and other terms of the applicable Offering Periods of each such Offering are identical and the provisions of the Plan will separately apply to each Offering. To the extent permitted by Treas. Reg. § 1.423-2(a)(1), the terms of each separate Offering need not be identical, *provided* that the terms of the Offering thereunder together satisfy Treas. Reg. § 1.423-2(a)(2) and (a)(3).

2.20 “**Offering Period**” means such period of time commencing on such date(s) as determined by the Board or Committee, in its sole discretion, and with respect to which Options shall be granted to Participants. The duration and timing of Offering Periods may be established or changed by the Board or Committee at any time, in its sole discretion. Notwithstanding the foregoing, in no event may an Offering Period exceed 27 months.

2.21 “**Option**” means the right to purchase shares of Common Stock pursuant to the Plan during each Offering Period.

2.22 “**Option Price**” means the purchase price of a share of Common Stock hereunder as provided in Section 4.2 hereof.

2.23 “**Parent**” means any entity that is a parent corporation of the Company within the meaning of Section 424 of the Code.

2.24 “**Participant**” means any Eligible Employee who elects to participate in the Plan.

2.25 “**Payday**” means the regular and recurring established day for payment of Compensation to an Employee of the Company or any Designated Subsidiary.

2.26 “**Plan**” means this 2020 Employee Stock Purchase Plan, as amended from time to time.

2.27 “**Plan Account**” means a bookkeeping account established and maintained by the Company in the name of each Participant.

2.28 “**Purchase Period**” means such period of time within an Offering Period commencing on such date(s) as determined by the Board or the Committee, in its sole discretion. The duration and timing of the Purchase Periods may be established or changed by the Board or Committee at any time, in its sole discretion. Notwithstanding the foregoing, in no event may a Purchase Period exceed the duration of the Offering Period under which it is established. Further notwithstanding the foregoing, the first Purchase Period shall commence under the first Offering Period on the Effective Date and end on May 14th, 2021, and shall be followed by three consecutive six month Purchase Periods. Each Offering Period thereafter shall be comprised of four six-month Purchase Periods.

2.29 “**Section 423 Option**” has the meaning set forth in Section 3.1(b) hereof.

2.30 “**Subsidiary**” means any entity that is a subsidiary corporation of the Company within the meaning of Section 424 of the Code. In addition, with respect to any sub-plans adopted under Section 7.1(d) hereof which are designed to be outside the scope of Section 423 of the Code, Subsidiary shall include any corporate or noncorporate entity in which the Company has a direct or indirect equity interest or significant business relationship.

2.31 “**Trading Day**” means a day on which the principal securities exchange on which the Common Stock is listed is open for trading or, if the Common Stock is not listed on a securities exchange, means a business day, as determined by the Administrator in good faith.

2.32 “**Withdrawal Election**” has the meaning set forth in Section 6.1(a) hereof.

**ARTICLE III.
PARTICIPATION**

3.1 Eligibility.

(a) Any Eligible Employee who is employed by the Company or a Designated Subsidiary on a given Enrollment Date for an Offering Period shall be eligible to participate in the Plan during such Offering Period, subject to the requirements of Articles IV and V hereof, and the limitations imposed by Section 423(b) of the Code.

(b) No Eligible Employee shall be granted an Option under the Plan which permits the Participant's rights to purchase shares of Common Stock under the Plan, and to purchase stock under all other employee stock purchase plans of the Company, any Parent or any Subsidiary subject to Section 423 of the Code (any such Option or other option, a "**Section 423 Option**"), to accrue at a rate which exceeds \$25,000 of fair market value of such stock (determined at the time the Section 423 Option is granted) for each calendar year in which any Section 423 Option granted to the Participant is outstanding at any time. For purposes of the limitation imposed by this subsection:

(i) the right to purchase stock under a Section 423 Option accrues when the Section 423 Option (or any portion thereof) first becomes exercisable during the calendar year;

(ii) the right to purchase stock under a Section 423 Option accrues at the rate provided in the Section 423 Option, but in no case may such rate exceed \$25,000 of fair market value of such stock (determined at the time such option is granted) for any one calendar year; and

(iii) a right to purchase stock which has accrued under a Section 423 Option may not be carried over to any other Section 423 Option; *provided* that Participants may carry forward amounts so accrued that represent a fractional share of stock and were withheld but not applied towards the purchase of Common Stock under an earlier Offering Period, and may apply such amounts towards the purchase of additional shares of Common Stock under a subsequent Offering Period.

The limitation under this Section 3.1(b) shall be applied in accordance with Section 423(b)(8) of the Code.

3.2 Election to Participate; Payroll Deductions

(a) Except as provided in Section 3.3 hereof and except as may otherwise be determined by the Administrator and/or as set forth in the Offering Document, an Eligible Employee may become a Participant in the Plan only by means of payroll deduction. Each individual who is an Eligible Employee as of an Offering Period's Enrollment Date may elect to participate in such Offering Period and the Plan by delivering to the Company a payroll deduction authorization no later than the period of time prior to the applicable Enrollment Date that is determined by the Administrator, in its sole discretion.

(b) Subject to Section 3.1(b) hereof, payroll deductions (i) shall be equal to at least 1% of the Participant's Compensation as of each Payday of the Offering Period following the Enrollment Date, but not more than 15% of the Participant's Compensation as of each Payday of the Offering Period following the Enrollment Date; and (ii) may be expressed either as (A) a whole number percentage, or (B) a fixed dollar amount. Amounts deducted from a Participant's Compensation with respect to an Offering Period pursuant to this Section 3.2 shall be deducted each Payday through payroll deduction and credited to the Participant's Plan Account; *provided* that the for the first Offering Period under this Plan, payroll deductions shall not begin until such date determined by the Administrator, in its sole discretion.

(c) Unless otherwise determined by the Administrator and/or as set forth in the Offering Document, following at least one payroll deduction, a Participant may decrease (to as low as zero) the amount deducted from such Participant's Compensation only once during an Offering Period upon ten calendar days' prior written notice to the Company. Unless otherwise determined by the Administrator and/or as set forth in the Offering Document, a Participant may not increase the amount deducted from such Participant's Compensation during an Offering Period.

(d) Notwithstanding the foregoing, upon the termination of an Offering Period, each Participant in such Offering Period shall automatically participate in the immediately following Offering Period at the same payroll deduction percentage or fixed amount as in effect at the termination of the prior Offering Period, unless such Participant delivers to the Company a different election with respect to the successive Offering Period in accordance with Section 3.2(a) hereof, or unless such Participant becomes ineligible for participation in the Plan.

3.3 Leave of Absence. During leaves of absence approved by the Company meeting the requirements of Treasury Regulation Section 1.421-1(h)(2), a Participant may continue participation in the Plan by making cash payments to the Company on his or her normal payday equal to his or her authorized payroll deduction.

ARTICLE IV. PURCHASE OF SHARES

4.1 Grant of Option. The Company may make one or more Offerings under the Plan, which may be successive or overlapping with one another, until the earlier of: (i) the date on which the Shares available under the Plan have been sold or (ii) the date on which the Plan is suspended or terminates. The Administrator shall designate the terms and conditions of each Offering in writing, as set forth in an offering document (the "**Offering Document**"), including without limitation, the Offering Period and the Purchase Periods. Each Participant shall be granted an Option with respect to an Offering Period on the applicable Grant Date. Subject to the limitations of Section 3.1(b) hereof, the number of shares of Common Stock subject to a Participant's Option shall be determined by dividing (a) such Participant's payroll deductions accumulated prior to an Exercise Date and retained in the Participant's Plan Account on such Exercise Date by (b) the applicable Option Price; *provided* that, unless otherwise set forth in the Offering Document, in no event shall a Participant be permitted to purchase during each Offering Period more than 80,000 shares of Common Stock (subject to any adjustment pursuant to Section 5.2 hereof). The Administrator and/or the Offering Document may, for future Offering Periods, increase or decrease, in its absolute discretion, the maximum number of shares of Common Stock that a Participant may purchase during such future Offering Periods. Each Option shall expire on the last Exercise Date for the applicable Offering Period immediately after the automatic exercise of the Option in accordance with Section 4.3 hereof, unless such Option terminates earlier in accordance with Article 6 hereof.

4.2 Option Price. The "**Option Price**" per share of Common Stock to be paid by a Participant upon exercise of the Participant's Option on an Exercise Date for an Offering Period shall be equal to 85% of the lesser of the Fair Market Value of a share of Common Stock on (a) the applicable Grant Date and (b) the applicable Exercise Date; *provided* that in no event shall the Option Price per share of Common Stock be less than the par value per share of the Common Stock.

4.3 Purchase of Shares.

(a) On each Exercise Date for an Offering Period, each Participant shall automatically and without any action on such Participant's part be deemed to have exercised his or her Option to purchase at the applicable per share Option Price the largest number of whole shares of Common Stock which can be purchased with the amount in the Participant's Plan Account. Except as may otherwise be provided by the Administrator with respect to any Purchase Period or Offering Period and/or as set forth in the Offering Document, any balance less than the per share Option Price that is remaining in the Participant's Plan Account (after exercise of such Participant's Option) as of the Exercise Date shall be carried forward to the next Purchase Period or Offering Period, unless the Participant has elected to withdraw from the Plan pursuant to Section 6.1 hereof or, pursuant to Section 6.2 hereof, such Participant has ceased to be an Eligible Employee. Any balance not carried forward to the next Purchase Period or Offering Period in accordance with the prior sentence promptly shall be refunded to the applicable Participant. For the avoidance of doubt, in no event shall an amount greater than or equal to the per share Option Price as of an Exercise Date be carried forward to the next Purchase Period or Offering Period.

(b) As soon as practicable following each Exercise Date, the number of shares of Common Stock purchased by such Participant pursuant to Section 4.3(a) hereof shall be delivered (either in share certificate or book entry form), in the Company's sole discretion, to either (i) the Participant or (ii) an account established in the Participant's name at a stock brokerage or other financial services firm designated by the Company. If the Company is required to obtain from any commission or agency authority to issue any such shares of Common Stock, the Company shall seek to obtain such authority. Inability of the Company to obtain from any such commission or agency authority which counsel for the Company deems necessary for the lawful issuance of any such shares shall relieve the Company from liability to any Participant except to refund to the Participant such Participant's Plan Account balance, without interest thereon. The Company may require that such shares of Common Stock be retained with a particular broker or agent for a designated period of time and/or may establish other procedures to permit tracking of qualifying and disqualifying dispositions of such shares of Common Stock.

4.4 Automatic Termination of Offering Period. If the Fair Market Value of a share of Common Stock on any Exercise Date (except the final scheduled Exercise Date of any Offering Period) is lower than the Fair Market Value of a share of Common Stock on the Grant Date for an Offering Period, then such Offering Period shall terminate on such Exercise Date after the automatic exercise of the Option in accordance with Section 4.3 hereof, and each Participant shall automatically be enrolled in the Offering Period that commences immediately following such Exercise Date and such Participant's payroll deduction authorization shall remain in effect for such Offering Period.

4.5 Transferability of Rights. An Option granted under the Plan shall not be transferable, other than by will or the applicable laws of descent and distribution, and is exercisable during the Participant's lifetime only by the Participant. No option or interest or right to the Option shall be available to pay off any debts, contracts or engagements of the Participant or his or her successors in interest or shall be subject to disposition by pledge, encumbrance, assignment or any other means whether such disposition be voluntary or involuntary or by operation of law by judgment, levy, attachment, garnishment or any other legal or equitable proceedings (including bankruptcy), and any attempt at disposition of the Option shall have no effect.

ARTICLE V. PROVISIONS RELATING TO COMMON STOCK

5.1 Common Stock Reserved. Subject to adjustment as provided in Section 5.2 hereof, the maximum number of shares of Common Stock that shall be made available for sale under the Plan shall be the sum of (a) 215,956 shares and (b) an annual increase on the first day of each year beginning in 2021 and ending in 2030 equal to the lesser of (i) one percent of the shares outstanding (on an as converted basis) on the last day of the immediately preceding fiscal year and (ii) such number of shares as may be determined by the Board; *provided, however*, no more than 15,000,000 shares may be issued under the Plan. Shares made available for sale under the Plan may be authorized but unissued shares, treasury shares of Common Stock, or reacquired shares reserved for issuance under the Plan.

5.2 Adjustments Upon Changes in Capitalization, Dissolution, Liquidation, Merger or Asset Sale.

(a) Changes in Capitalization. Subject to any required action by the stockholders of the Company, the number of shares of Common Stock which have been authorized for issuance under the Plan but not yet placed under Option, as well as the price per share and the number of shares of Common Stock covered by each Option under the Plan which has not yet been exercised shall be proportionately adjusted for any increase or decrease in the number of issued shares of Common Stock resulting from a stock split, reverse stock split, stock dividend, combination or reclassification of the Common Stock, or any other increase or decrease in the number of shares of Common Stock effected without receipt of consideration by the Company; *provided, however*, that conversion of any convertible securities of the Company shall not be deemed to have been "effected without receipt of consideration." Such adjustment shall be made by the Administrator, whose determination in that respect shall be final, binding and conclusive. Except as expressly provided herein, no issuance by the Company of shares of stock of any class, or securities convertible into shares of stock of any class, shall affect, and no adjustment by reason thereof shall be made with respect to, the number or price of shares of Common Stock subject to an Option.

(b) Dissolution or Liquidation. In the event of the proposed dissolution or liquidation of the Company, the Offering Periods then in progress shall be shortened by setting a new Exercise Date (the “**New Exercise Date**”), and shall terminate immediately prior to the consummation of such proposed dissolution or liquidation, unless provided otherwise by the Administrator. The New Exercise Date shall be before the date of the Company’s proposed dissolution or liquidation. The Administrator shall notify each Participant in writing, at least ten business days prior to the New Exercise Date, that the Exercise Date for the Participant’s Option has been changed to the New Exercise Date and that the Participant’s Option shall be exercised automatically on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Offering Period as provided in Section 6.1 hereof.

(c) Merger or Asset Sale. In the event of a proposed sale of all or substantially all of the assets of the Company, or the merger of the Company with or into another corporation, each outstanding Option shall be assumed or an equivalent Option substituted by the successor corporation or a Parent or Subsidiary of the successor corporation. In the event that the successor corporation refuses to assume or substitute for the Option, any Offering Periods then in progress shall be shortened by setting a New Exercise Date and any Offering Periods then in progress shall end on the New Exercise Date. The New Exercise Date shall be before the date of the Company’s proposed sale or merger. The Administrator shall notify each Participant in writing, at least ten business days prior to the New Exercise Date, that the Exercise Date for the Participant’s Option has been changed to the New Exercise Date and that the Participant’s Option shall be exercised automatically on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Offering Period as provided in Section 6.1 hereof.

5.3 Insufficient Shares. If the Administrator determines that, on a given Exercise Date, the number of shares of Common Stock with respect to which Options are to be exercised may exceed the number of shares of Common Stock remaining available for sale under the Plan on such Exercise Date, the Administrator shall make a pro rata allocation of the shares of Common Stock available for issuance on such Exercise Date in as uniform a manner as shall be practicable and as it shall determine in its sole discretion to be equitable among all Participants exercising Options to purchase Common Stock on such Exercise Date, and unless additional shares are authorized for issuance under the Plan, no further Offering Periods shall take place and the Plan shall terminate pursuant to Section 7.5 hereof. If an Offering Period is so terminated, then the balance of the amount credited to the Participant’s Plan Account which has not been applied to the purchase of shares of Common Stock shall be paid to such Participant in one lump sum in cash within 30 days after such Exercise Date, without any interest thereon.

5.4 Rights as Stockholders. With respect to shares of Common Stock subject to an Option, a Participant shall not be deemed to be a stockholder of the Company and shall not have any of the rights or privileges of a stockholder. A Participant shall have the rights and privileges of a stockholder of the Company when, but not until, shares of Common Stock have been deposited in the designated brokerage account following exercise of his or her Option.

ARTICLE VI. TERMINATION OF PARTICIPATION

6.1 Cessation of Contributions; Voluntary Withdrawal.

(a) A Participant may cease payroll deductions during an Offering Period and elect to withdraw from the Plan by delivering written notice of such election to the Company in such form and at such time prior to the Exercise Date for such Offering Period as may be established by the Administrator (a “**Withdrawal Election**”). A Participant electing to withdraw from the Plan may elect to either (i) withdraw all of the funds then credited to the Participant’s Plan Account as of the date on which the Withdrawal Election is received by the Company, in which case amounts credited to such Plan Account shall be returned to the Participant in one lump-sum payment in cash within 30 days after such election is received by the Company, without any interest thereon, and the Participant shall cease to

participate in the Plan and the Participant's Option for such Offering Period shall terminate; or (ii) exercise the Option for the maximum number of whole shares of Common Stock on the applicable Exercise Date with any remaining Plan Account balance returned to the Participant in one lump-sum payment in cash within 30 days after such Exercise Date, without any interest thereon, and after such exercise cease to participate in the Plan. Upon receipt of a Withdrawal Election, the Participant's payroll deduction authorization and his or her Option to purchase under the Plan shall terminate.

(b) A Participant's withdrawal from the Plan shall not have any effect upon his or her eligibility to participate in any similar plan which may hereafter be adopted by the Company or in succeeding Offering Periods which commence after the termination of the Offering Period from which the Participant withdraws.

(c) Except as otherwise permitted by the Administrator and/or as set forth in the Offering Document, a Participant who ceases contributions to the Plan during any Offering Period shall not be permitted to resume contributions to the Plan during that Offering Period.

6.2 Termination of Eligibility. Upon a Participant's ceasing to be an Eligible Employee, for any reason, such Participant's Option for the applicable Offering Period shall automatically terminate, he or she shall be deemed to have elected to withdraw from the Plan, and such Participant's Plan Account shall be paid to such Participant or, in the case of his or her death, to the person or persons entitled thereto pursuant to applicable law, within 30 days after such cessation of being an Eligible Employee, without any interest thereon.

ARTICLE VII. GENERAL PROVISIONS

7.1 Administration.

(a) The Plan shall be administered by the Committee, which shall be composed of members of the Board. The Committee may delegate administrative tasks under the Plan to the services of an Agent or Employees to assist in the administration of the Plan, including establishing and maintaining an individual securities account under the Plan for each Participant.

(b) It shall be the duty of the Administrator to conduct the general administration of the Plan in accordance with the provisions of the Plan. The Administrator shall have the power, subject to, and within the limitations of, the express provisions of the Plan:

(i) To establish and terminate Offerings;

(ii) To determine when and how Options shall be granted and the provisions and terms of each Offering (which need not be identical);

(iii) To select Designated Subsidiaries in accordance with Section 7.2 hereof; and

(iv) To construe and interpret the Plan, the terms of any Offering and the terms of the Options and to adopt such rules for the administration, interpretation, and application of the Plan as are consistent therewith and to interpret, amend or revoke any such rules. The Administrator, in the exercise of this power, may correct any defect, omission or inconsistency in the Plan, any Offering or any Option, in a manner and to the extent it shall deem necessary or expedient to administer the Plan, subject to Section 423 of the Code.

(c) The Administrator may adopt rules or procedures relating to the operation and administration of the Plan to accommodate the specific requirements of local laws and procedures. Without limiting the generality of the foregoing, the Administrator is specifically authorized to adopt rules and procedures regarding handling of participation elections, payroll deductions, payment of interest, conversion of local currency, payroll tax, withholding procedures and handling of stock certificates which vary with local requirements. In its absolute discretion, the Board may at any time and from time to time exercise any and all rights and duties of the Administrator under the Plan.

(d) The Administrator may adopt sub-plans applicable to particular Designated Subsidiaries or locations, which sub-plans may be designed to be outside the scope of Section 423 of the Code. The rules of such sub-plans may take precedence over other provisions of this Plan, with the exception of Section 5.1 hereof, but unless otherwise superseded by the terms of such sub-plan, the provisions of this Plan shall govern the operation of such sub-plan.

(e) All expenses and liabilities incurred by the Administrator in connection with the administration of the Plan shall be borne by the Company. The Administrator may, with the approval of the Committee, employ attorneys, consultants, accountants, appraisers, brokers or other persons. The Administrator, the Company and its officers and directors shall be entitled to rely upon the advice, opinions or valuations of any such persons. All actions taken and all interpretations and determinations made by the Administrator in good faith shall be final and binding upon all Participants, the Company and all other interested persons. No member of the Board or Administrator shall be personally liable for any action, determination or interpretation made in good faith with respect to the Plan or the options, and all members of the Board or Administrator shall be fully protected by the Company in respect to any such action, determination, or interpretation.

7.2 Designation of Subsidiary Corporations. The Board or Committee shall designate from among the Subsidiaries, as determined from time to time, the Subsidiary or Subsidiaries that shall constitute Designated Subsidiaries. The Board or Committee may designate a Subsidiary, or terminate the designation of a Subsidiary, without the approval of the stockholders of the Company.

7.3 Reports. Individual accounts shall be maintained for each Participant in the Plan. Statements of Plan Accounts shall be given to Participants at least annually, which statements shall set forth the amounts of payroll deductions, the Option Price, the number of shares purchased and the remaining cash balance, if any.

7.4 No Right to Employment. Nothing in the Plan shall be construed to give any person (including any Participant) the right to remain in the employ of the Company, a Parent or a Subsidiary or to affect the right of the Company, any Parent or any Subsidiary to terminate the employment of any person (including any Participant) at any time, with or without cause, which right is expressly reserved.

7.5 Amendment and Termination of the Plan.

(a) The Board may, in its sole discretion, amend, suspend or terminate the Plan at any time and from time to time; *provided, however,* that without approval of the Company's stockholders given within 12 months before or after action by the Board, the Plan may not be amended to increase the maximum number of shares of Common Stock subject to the Plan or change the designation or class of Eligible Employees; and *provided, further* that without approval of the Company's stockholders, the Plan may not be amended in any manner that would cause the Plan to no longer be an "employee stock purchase plan" within the meaning of Section 423(b) of the Code.

(b) In the event the Administrator determines that the ongoing operation of the Plan may result in unfavorable financial accounting consequences, the Administrator may, to the extent permitted under Section 423 of the Code, in its discretion and, to the extent necessary or desirable, modify or amend the Plan to reduce or eliminate such accounting consequence including, but not limited to:

- (i) altering the Option Price for any Offering Period including an Offering Period underway at the time of the change in Option Price;
- (ii) shortening any Offering Period so that the Offering Period ends on a new Exercise Date, including an Offering Period underway at the time of the Administrator action; and
- (iii) allocating shares of Common Stock.

Such modifications or amendments shall not require stockholder approval or the consent of any Participant.

(c) Upon termination of the Plan, the balance in each Participant's Plan Account shall be refunded as soon as practicable after such termination, without any interest thereon.

7.6 Use of Funds; No Interest Paid. All funds received by the Company by reason of purchase of shares of Common Stock under the Plan shall be included in the general funds of the Company free of any trust or other restriction and may be used for any corporate purpose. No interest shall be paid to any Participant or credited under the Plan.

7.7 Term; Approval by Stockholders. No Option may be granted during any period of suspension of the Plan or after termination of the Plan. The Plan shall be submitted for the approval of the Company's stockholders within 12 months after the date of the Board's initial adoption of the Plan. Options may be granted prior to such stockholder approval; *provided, however*, that such Options shall not be exercisable prior to the time when the Plan is approved by the stockholders; *provided, further* that if such approval has not been obtained by the end of the 12-month period, all Options previously granted under the Plan shall thereupon terminate and be canceled and become null and void without being exercised.

7.8 Effect Upon Other Plans. The adoption of the Plan shall not affect any other compensation or incentive plans in effect for the Company, any Parent or any Subsidiary. Nothing in the Plan shall be construed to limit the right of the Company, any Parent or any Subsidiary (a) to establish any other forms of incentives or compensation for Employees of the Company or any Parent or any Subsidiary, or (b) to grant or assume Options otherwise than under the Plan in connection with any proper corporate purpose, including, but not by way of limitation, the grant or assumption of options in connection with the acquisition, by purchase, lease, merger, consolidation or otherwise, of the business, stock or assets of any corporation, firm or association.

7.9 Conformity to Securities Laws. Notwithstanding any other provision of the Plan, the Plan and the participation in the Plan by any individual who is then subject to Section 16 of the Exchange Act shall be subject to any additional limitations set forth in any applicable exemption rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3 of the Exchange Act) that are requirements for the application of such exemptive rule. To the extent permitted by applicable law, the Plan shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

7.10 Notice of Disposition of Shares. Each Participant shall give the Company prompt notice of any disposition or other transfer of any shares of Common Stock, acquired pursuant to the exercise of an Option, if such disposition or transfer is made (a) within two years after the applicable Grant Date or (b) within one year after the transfer of such shares of Common Stock to such Participant upon exercise of such Option. The Company may direct that any certificates evidencing shares acquired pursuant to the Plan refer to such requirement.

7.11 Tax Withholding. The Company or any Parent or any Subsidiary shall be entitled to require payment in cash or deduction from other compensation payable to each Participant of any sums required by federal, state or local tax law to be withheld with respect to any purchase of shares of Common Stock under the Plan or any sale of such shares.

7.12 Governing Law. The Plan and all rights and obligations thereunder shall be construed and enforced in accordance with the laws of the State of Delaware, without regard to the conflict of law rules thereof or of any other jurisdiction.

7.13 Notices. All notices or other communications by a Participant to the Company under or in connection with the Plan shall be deemed to have been duly given when received in the form specified by the Company at the location, or by the person, designated by the Company for the receipt thereof.

7.14 Conditions To Issuance of Shares.

(a) Notwithstanding anything herein to the contrary, the Company shall not be required to issue or deliver any certificates or make any book entries evidencing shares of Common Stock pursuant to the exercise of an Option by a Participant, unless and until the Board or the Committee has determined, with advice of counsel, that the issuance of such shares of Common Stock is in compliance with all applicable laws, regulations of governmental authorities and, if applicable, the requirements of any securities exchange or automated quotation system on which the shares of Common Stock are listed or traded, and the shares of Common Stock are covered by an effective registration statement or applicable exemption from registration. In addition to the terms and conditions provided herein, the Board or the Committee may require that a Participant make such reasonable covenants, agreements, and representations as the Board or the Committee, in its discretion, deems advisable in order to comply with any such laws, regulations, or requirements.

(b) All certificates for shares of Common Stock delivered pursuant to the Plan and all shares of Common Stock issued pursuant to book entry procedures are subject to any stop-transfer orders and other restrictions as the Committee deems necessary or advisable to comply with federal, state, or foreign securities or other laws, rules and regulations and the rules of any securities exchange or automated quotation system on which the shares of Common Stock are listed, quoted, or traded. The Committee may place legends on any certificate or book entry evidencing shares of Common Stock to reference restrictions applicable to the shares of Common Stock.

(c) The Committee shall have the right to require any Participant to comply with any timing or other restrictions with respect to the settlement, distribution or exercise of any Option, including a window-period limitation, as may be imposed in the sole discretion of the Committee.

(d) Notwithstanding any other provision of the Plan, unless otherwise determined by the Committee or required by any applicable law, rule or regulation, the Company may, in lieu of delivering to any Participant certificates evidencing shares of Common Stock issued in connection with any Option, record the issuance of shares of Common Stock in the books of the Company (or, as applicable, its transfer agent or stock plan administrator).

7.15 Equal Rights and Privileges. Except with respect to sub-plans designed to be outside the scope of Section 423 of the Code, all Eligible Employees of the Company (or of any Designated Subsidiary) granted Options pursuant to an Offering shall have equal rights and privileges under this Plan to the extent required under Section 423 of the Code so that this Plan qualifies as an “employee stock purchase plan” within the meaning of Section 423 of the Code. Any provision of this Plan that is inconsistent with Section 423 of the Code shall, without further act or amendment by the Company or the Board, be reformed to comply with the equal rights and privileges requirement of Section 423 of the Code.

* * * * *

I hereby certify that the foregoing Plan was adopted by the Board of Directors of 4D Molecular Therapeutics, Inc. on _____, 2020.

I hereby certify that the foregoing Plan was approved by the stockholders of 4D Molecular Therapeutics, Inc. on _____, 2020.

Executed on _____, 2020.

Corporate Secretary

4D MOLECULAR THERAPEUTICS, INC.**INDEMNIFICATION AGREEMENT**

This Indemnification Agreement (this "Agreement") is effective as of «Date» by and between 4D Molecular Therapeutics, Inc., a Delaware corporation (the "Company"), and «Indemnitee» ("Indemnitee"). This Agreement supersedes and replaces any and all previous agreements between the Company and the Indemnitee covering indemnification.

A. The Company recognizes the difficulty in obtaining liability insurance for its directors, officers, employees, controlling persons, fiduciaries and other agents and affiliates, the significant cost of such insurance and the general limitations in the coverage of such insurance.

B. The Company further recognizes the substantial increase in corporate litigation in general, subjecting directors, officers, employees, controlling persons, fiduciaries and other agents and affiliates to expensive litigation risks at the same time as the availability and coverage of liability insurance has been severely limited.

C. The current protection available to directors, officers, employees, controlling persons, fiduciaries and other agents and affiliates of the Company may not be adequate under the present circumstances, and directors, officers, employees, controlling persons, fiduciaries and other agents and affiliates of the Company (or persons who may be alleged or deemed to be the same), including the Indemnitee, may not be willing to serve or continue to serve or be associated with the Company in such capacities without additional protection.

D. The Company (a) desires to attract and retain the involvement of highly qualified persons, such as Indemnitee, to serve and be associated with the Company, and (b) accordingly, wishes to provide for the indemnification and advancement of expenses to the Indemnitee to the maximum extent permitted by law.

E. In view of the considerations set forth above, the Company desires that Indemnitee shall be indemnified and advanced expenses by the Company as set forth herein.

AGREEMENT:

In consideration of the mutual promises and covenants contained herein, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. Certain Definitions.

(a) "*Change in Control*" shall be deemed to have occurred if, on or after the date of this Agreement, (i) any "person" (as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended), other than a trustee or other fiduciary holding securities under an employee benefit plan of the Company acting in such capacity or a corporation owned directly or indirectly by the stockholders of the Company in substantially the same proportions as their ownership of stock of the Company, becomes the "beneficial owner"

(as defined in Rule 13d-3 under said Act), directly or indirectly, of securities of the Company representing more than fifty percent (50%) of the total voting power represented by the Company's then outstanding Voting Securities, (ii) during any period of two (2) consecutive years, individuals who at the beginning of such period constitute the Board of Directors of the Company and any new director whose election by the Board of Directors or nomination for election by the Company's stockholders was approved by a vote of at least two-thirds (2/3) of the directors then still in office who either were directors at the beginning of the period or whose election or nomination for election was previously so approved, cease for any reason to constitute a majority thereof, (iii) the appointment or election of two (2) or more persons to the Board of Directors of the Company as a result of an actual or threatened solicitation of proxies or election contest with respect to directors of the Board of Directors of the Company, in each case, by or on behalf of a person other than the Board of Directors, (iv) the stockholders of the Company approve a merger or consolidation of the Company with any other corporation other than a merger or consolidation which would result in the Voting Securities of the Company outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into Voting Securities of the surviving entity) at least eighty percent (80%) of the total voting power represented by the Voting Securities of the Company or such surviving entity outstanding immediately after such merger or consolidation or (iv) the stockholders of the Company approve a plan of complete liquidation of the Company or an agreement for the sale or disposition by the Company of (in one transaction or a series of related transactions) all or substantially all of the Company's assets.

(b) "Claim" shall mean with respect to a Covered Event: any threatened, asserted, pending or completed action, suit, proceeding or alternative dispute resolution mechanism, or any hearing, inquiry or investigation (formal or informal) that Indemnitee [(or in the case of a Fund Indemnitor (as defined in Section 18 below) seeking to be indemnified, a Fund Indemnitor)]¹ in good faith believes might lead to the institution of any such action, suit, proceeding or alternative dispute resolution mechanism, whether civil, criminal, administrative, investigative or other, including any appeal therefrom.

(c) References to the "Company" shall include, in addition to 4D Molecular Therapeutics, Inc., any constituent corporation (including any constituent of a constituent) absorbed in a consolidation or merger to which 4D Molecular Therapeutics, Inc. (or any of its wholly owned subsidiaries) is a party, which, if its separate existence had continued, would have had power and authority to indemnify its directors, officers, employees, agents or fiduciaries, so that if Indemnitee is or was a director, officer, employee, agent or fiduciary of such constituent corporation, or is or was serving at the request of such constituent corporation as a director, officer, employee, agent or fiduciary of another corporation, partnership, joint venture, employee benefit plan, trust or other enterprise, Indemnitee shall stand in the same position under the provisions of this Agreement with respect to the resulting or surviving corporation as Indemnitee would have with respect to such constituent corporation if its separate existence had continued.

(d) "Covered Event" shall mean any event or occurrence by reason of the fact that Indemnitee is or was a director, officer, employee, agent or fiduciary of the Company, or any subsidiary of the Company, direct or indirect, whether before or after the date of this Agreement, or is or was serving at the request of the Company as a director, officer, employee, agent or fiduciary of another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action or inaction on the part of Indemnitee while serving in such capacity, whether before or after the date of this Agreement.

¹ **Note to Form:** To be included when applicable.

(e) “*Expense Advance*” shall mean a payment to Indemnitee for Expenses pursuant to Section 3 hereof, in advance of the settlement of or final judgment in any action, suit, proceeding or alternative dispute resolution mechanism, hearing, inquiry or investigation, which constitutes a Claim.

(f) “*Expenses*” shall mean any and all direct and indirect costs, losses, claims, damages, fees, expenses and liabilities, joint or several (including reasonable attorneys’ fees and all other costs, expenses and obligations reasonably incurred in connection with investigating, defending, being a witness in or participating in (including on appeal), or preparing to defend, to be a witness in or to participate in, any action, suit, proceeding, alternative dispute resolution mechanism, hearing, inquiry or investigation), judgments, fines, penalties and amounts paid in settlement (if such settlement is approved in advance by the Company, which approval shall not be unreasonably withheld) actually and reasonably incurred, of any Claim and any federal, state, local or foreign taxes imposed on the Indemnitee as a result of the actual or deemed receipt of any payments under this Agreement, ERISA excise taxes and penalties.

(g) “*Independent Legal Counsel*” shall mean an attorney or firm of attorneys, selected in accordance with the provisions of Section 2(d) hereof, who shall not have otherwise performed services for (i) the Company or Indemnitee in any matter material to either such party (other than with respect to matters concerning the rights of Indemnitee under this Agreement, or of other indemnitees under similar indemnity agreements) or (ii) any other party to the Claim giving rise to a claim for indemnification hereunder, within the last three (3) years. Notwithstanding the foregoing, the term “Independent Legal Counsel” shall not include any person who, under the applicable standards of professional conduct then prevailing, would have a conflict of interest in representing either the Company or Indemnitee in an action to determine Indemnitee’s rights under this Agreement.

(h) References to “*other enterprises*” shall include employee benefit plans; references to “*fin*es” shall include any excise taxes assessed on Indemnitee with respect to an employee benefit plan; and references to “*serv*ing at the request of the Company” shall include any service as a director, officer, employee, agent or fiduciary of the Company which imposes duties on, or involves services by, such director, officer, employee, agent or fiduciary with respect to an employee benefit plan, its participants or its beneficiaries; and if Indemnitee acted in good faith and in a manner Indemnitee reasonably believed to be in the interest of the participants and beneficiaries of an employee benefit plan, Indemnitee shall be deemed to have acted in a manner “*not opposed to the best interests of the Company*” as referred to in this Agreement.

(i) “*Reviewing Party*” shall mean, subject to the provisions of Section 2(d), any person or body appointed by the Board of Directors in accordance with applicable law to review the Company’s obligations hereunder and under applicable law, which may include a member or members of the Company’s Board of Directors, Independent Legal Counsel or any other person or body not a party to the particular Claim for which Indemnitee is seeking indemnification, exoneration or hold harmless rights. In the absence of the appointment of another Reviewing Party, but subject to the provisions of Section 2(d), the full Board of Directors shall be deemed to be the “*Reviewing Party*” within the meaning of this Agreement.

(j) “*Section*” refers to a section of this Agreement unless otherwise indicated.

(k) “*Voting Securities*” shall mean any securities of the Company that vote generally in the election of directors.

2. Indemnification.

(a) Indemnification of Expenses. Subject to the provisions of Section 2(b) below, the Company shall indemnify, exonerate or hold harmless Indemnitee for Expenses to the fullest extent permitted by law if Indemnitee was, is or becomes a party to or witness or other participant in, or is threatened to be made a party to or witness or other participant in, any Claim (whether by reason of or arising in part out of a Covered Event), including all interest, assessments and other charges incurred in connection with or in respect of such Expenses.

(b) Review of Indemnification Obligations.

(i) Notwithstanding the foregoing, in the event any Reviewing Party shall have determined (in a written opinion, in any case in which Independent Legal Counsel is the Reviewing Party) that Indemnitee is not entitled to be indemnified, exonerated or held harmless hereunder under applicable law, (A) the Company shall have no further obligation under Section 2(a) to make any payments to Indemnitee not made prior to such determination by such Reviewing Party and (B) the Company shall be entitled to be reimbursed by Indemnitee (who hereby agrees to reimburse the Company) for all Expenses theretofore paid in indemnifying, exonerating or holding harmless Indemnitee (within thirty (30) days after such determination); *provided, however*, that if Indemnitee has commenced or thereafter commences legal proceedings in a court of competent jurisdiction to secure a determination that Indemnitee is entitled to be indemnified, exonerated or held harmless hereunder under applicable law, any determination made by any Reviewing Party that Indemnitee is not entitled to be indemnified hereunder under applicable law shall not be binding and Indemnitee shall not be required to reimburse the Company for any Expenses theretofore paid in indemnifying, exonerating or holding harmless Indemnitee until a final judicial determination is made with respect thereto (as to which all rights of appeal therefrom have been exhausted or lapsed). Indemnitee’s obligation to reimburse the Company for any Expenses shall be unsecured and no interest shall be charged thereon.

(ii) Subject to Section 2(b)(iii) below, if the Reviewing Party shall not have made a determination within forty-five (45) days after receipt by the Company of the request therefor, the requisite determination of entitlement to indemnification shall, to the fullest extent not prohibited by law, be deemed to have been made and Indemnitee shall be entitled to such indemnification, absent (A) a misstatement by Indemnitee of a material fact, or an omission of a material fact necessary to make Indemnitee’s statement not materially misleading, in connection with the request for indemnification or (B) a prohibition of such indemnification under applicable law; *provided, however*, that such 45-day period may be extended for a reasonable time, not to exceed an additional thirty (30) days, if the person, persons or entity making the determination with respect to entitlement to indemnification in good faith requires such additional time for the obtaining or evaluating of documentation and/or information relating thereto.

(iii) Notwithstanding anything in this Agreement to the contrary, no determination as to entitlement of Indemnitee to indemnification under this Agreement shall be required to be made prior to the final disposition of the Claim.

(c) Indemnitee Rights on Unfavorable Determination; Binding Effect. If any Reviewing Party determines that Indemnitee substantively is not entitled to be indemnified, exonerated or held harmless hereunder in whole or in part under applicable law, Indemnitee shall have the right to commence litigation seeking an initial determination by the court or challenging any such determination by such Reviewing Party or any aspect thereof, including the legal or factual bases therefor, and, subject to the provisions of Section 15 hereof, the Company hereby consents to service of process and to appear in any such proceeding. Absent such litigation, any determination by any Reviewing Party shall be conclusive and binding on the Company and Indemnitee.

(d) Selection of Reviewing Party; Change in Control. If there has not been a Change in Control, any Reviewing Party shall be selected by the Board of Directors, which may be the full Board of Directors in the absence of the selection of another Reviewing Party, and if there has been such a Change in Control, any Reviewing Party with respect to all matters thereafter arising concerning Indemnitee's indemnification, exonerated or held harmless rights for Expenses under this Agreement or any other agreement or under the Company's Certificate of Incorporation or bylaws as now or hereafter in effect, or under any other applicable law, if desired by Indemnitee, shall be Independent Legal Counsel selected by the Indemnitee and approved by Company (which approval shall not be unreasonably withheld). Such counsel, among other things, shall render its written opinion to the Company and Indemnitee as to whether and to what extent Indemnitee would be entitled to be indemnified, exonerated or held harmless hereunder under applicable law and the Company agrees to abide by such opinion. The Company agrees to pay the reasonable fees of the Independent Legal Counsel referred to above and to fully indemnify, exonerate and hold harmless such counsel against any and all expenses (including attorneys' fees), claims, liabilities and damages arising out of or relating to this Agreement or its engagement pursuant hereto. Notwithstanding any other provision of this Agreement, the Company shall not be required to pay Expenses of more than one Independent Legal Counsel in connection with all matters concerning a single Indemnitee, and such Independent Legal Counsel shall be the Independent Legal Counsel for any or all other Indemnitees unless (i) the Company otherwise determines or (ii) any Indemnitee shall provide a written statement setting forth in detail a reasonable objection to such Independent Legal Counsel representing other Indemnitees.

(e) Mandatory Payment of Expenses. Notwithstanding any other provision of this Agreement other than Section 10 hereof, to the fullest extent permitted by applicable law and to the extent that Indemnitee was a party to (or participant in) and has been successful on the merits or otherwise, including, without limitation, the dismissal of an action without prejudice, in defense of any Claim, Indemnitee shall be indemnified, exonerated and held harmless against all Expenses actually and reasonably incurred by Indemnitee in connection therewith. If Indemnitee is not wholly successful in such Claim but is successful, on the merits or otherwise, as to one or more but less than all claims, issues or matters in such Claim, the Company shall indemnify Indemnitee against all Expenses actually and reasonably incurred by him or on his behalf in connection with or related to each successfully resolved claim, issue or matter to the fullest extent permitted by law. For purposes of this Section and without limitation, the termination of any claim, issue or matter in such a Claim by dismissal, with or without prejudice, shall be deemed to be a successful result as to such claim, issue or matter.

(f) Contribution. If the indemnification, exoneration or hold harmless rights provided for in this Agreement are for any reason held by a court of competent jurisdiction to be unavailable to an Indemnitee, then in lieu of indemnifying, exonerating or holding harmless Indemnitee thereunder, the Company shall contribute to the amount paid or required to be paid by Indemnitee as a result of such Expenses (i) in such proportion as is deemed fair and reasonable in light of all of the circumstances in order to reflect the relative benefits received by the Company and Indemnitee as a result of the event(s) and/or transaction(s) giving cause to such Claim or (ii) if the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Company (and its directors, officers, employees and agents) and Indemnitee in connection with the action or inaction which resulted in such Expenses, as well as any other relevant equitable considerations. In connection with the registration of the Company's securities, the relative benefits received by the Company and Indemnitee shall be deemed to be in the same respective proportions that the net proceeds from the offering (before deducting expenses) received by the Company and Indemnitee, in each case as set forth in the table on the cover page of the applicable prospectus, bear to the aggregate public offering price of the securities so offered. The relative fault of the Company and Indemnitee shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company or Indemnitee and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

The Company and Indemnitee agree that it would not be just and equitable if contribution pursuant to this Section 2(f) were determined by pro rata or by any other method of allocation which does not take account of the equitable considerations referred to in the immediately preceding paragraph. In connection with the registration of the Company's securities, in no event shall Indemnitee be required to contribute any amount under this Section 2(f) in excess of the net proceeds received by Indemnitee from its sale of securities under such registration statement. No person found guilty of fraudulent misrepresentation (within the meaning of Section 11(a) of the Securities Act of 1933, as amended) shall be entitled to contribution from any person who was not found guilty of such fraudulent misrepresentation.

3. Expense Advances.

(a) Obligation to Make Expense Advances. The Company shall make Expense Advances to Indemnitee upon receipt of a written undertaking, in the form attached hereto as Exhibit A, by or on behalf of the Indemnitee to repay such amounts if it shall ultimately be determined that the Indemnitee is not entitled to be indemnified, exonerated or held harmless therefor by the Company.

(b) Form of Undertaking. Any written undertaking by the Indemnitee to repay any Expense Advances hereunder shall be unsecured and no interest shall be charged thereon.

4. Procedures for Indemnification and Expense Advances.

(a) Timing of Payments. All payments of Expenses (including without limitation Expense Advances) by the Company to the Indemnitee pursuant to this Agreement shall be made to the fullest extent permitted by law as soon as practicable after written demand by Indemnitee therefor is presented to the Company, but in no event later than forty-five (45) days after such written demand by Indemnitee is presented to the Company, except in the case of Expense Advances, which shall be made no later than twenty (20) days after such written demand by Indemnitee is presented to the Company. If the Company disputes a portion of the amounts for which indemnification is requested, the undisputed portion shall be paid and only the disputed portion withheld pending resolution of any such dispute.

(b) Notice/Cooperation by Indemnitee. Indemnitee shall, as a condition precedent to Indemnitee's right to be indemnified, exonerated or held harmless or Indemnitee's right to receive Expense Advances under this Agreement, give the Company notice in writing as soon as practicable of any Claim made against Indemnitee for which indemnification, exoneration or hold harmless rights will or could be sought under this Agreement. Notice to the Company shall be directed to the President and the Secretary of the Company at the address shown on the signature page of this Agreement (or such other address as the Company shall designate in writing to Indemnitee) and shall include a description of the nature of the Claim and the facts underlying the Claim, in each case to the extent known to Indemnitee. To obtain indemnification under this Agreement, Indemnitee shall submit to the Company a written request, including therein or therewith such documentation and information as is reasonably available to Indemnitee and is reasonably necessary to determine whether and to what extent Indemnitee is entitled to indemnification following the final disposition of such Claim. In addition, Indemnitee shall give the Company such information and cooperation as the Company may reasonably require and as shall be within Indemnitee's power. The failure by Indemnitee to notify the Company hereunder will not relieve the Company from any liability which it may have to Indemnitee hereunder or otherwise than under this Agreement, and any delay in so notifying the Company shall not constitute a waiver by Indemnitee of any rights under this Agreement, except to the extent (solely with respect to the indemnity hereunder) that such failure or delay materially prejudices the Company.

(c) Presumptions; Burden of Proof. (i) In making a determination with respect to entitlement to indemnification hereunder, the person or persons or entity making such determination will, to the fullest extent not prohibited by law, presume Indemnitee is entitled to indemnification under this Agreement if Indemnitee has submitted a request for indemnification in accordance with this Agreement, and the Company will, to the fullest extent not prohibited by law, have the burden of proof by clear and convincing evidence to overcome that presumption.

Neither the failure of the Company (including by its directors or Independent Legal Counsel) to have made a determination prior to the commencement of any action pursuant to this Agreement that indemnification is proper in the circumstances because Indemnitee has met the applicable standard of conduct, nor an actual determination by the Company (including by its directors or Independent Legal Counsel) that Indemnitee has not met such applicable standard of conduct, will be a defense to the action or create a presumption that Indemnitee has not met the applicable standard of conduct.

(iii) The termination of any Proceeding or of any claim, issue or matter therein, by judgment, order, settlement or conviction, or upon a *plea of nolo contendere* or its equivalent, will not (except as otherwise expressly provided in this Agreement) of itself adversely affect the right of Indemnitee to indemnification or create a presumption that Indemnitee did not act in good faith and in a manner which Indemnitee reasonably believed to be in or not opposed to the best interests of the Company or, with respect to any criminal Proceeding, that Indemnitee had reasonable cause to believe that Indemnitee's conduct was unlawful.

(iv) For purposes of any determination of good faith, Indemnitee will be deemed to have acted in good faith if Indemnitee acted based on the records or books of account of the Company or its subsidiaries, including financial statements, or on information supplied to Indemnitee by the directors or officers of the Company or its subsidiaries in the course of their duties, or on the advice of legal counsel for the Company or its subsidiaries or on information or records given or reports made to the Company by an independent certified public accountant or by an appraiser, financial advisor or other expert selected with reasonable care by or on behalf of the Company or its subsidiaries. Further, Indemnitee will be deemed to have acted in a manner "not opposed to the best interests of the Company," as referred to in this Agreement if Indemnitee acted in good faith and in a manner Indemnitee reasonably believed to be in the best interests of the participants and beneficiaries of an employee benefit plan. The provisions of this Section 4(c) are not exclusive and do not limit in any way the other circumstances in which the Indemnitee may be deemed to have met the applicable standard of conduct set forth in this Agreement.

(d) Notice to Insurers. If, at the time of the receipt by the Company of a notice of a Claim pursuant to Section 4(b) hereof, the Company has liability insurance in effect which may cover such Claim, the Company shall give prompt notice of the commencement of such Claim to the insurers in accordance with the procedures set forth in the respective policies. The Company shall thereafter take all reasonably necessary or desirable action to cause such insurers to pay, on behalf of the Indemnitee, all amounts payable as a result of such Claim in accordance with the terms of such policies.

(e) Selection of Counsel. In the event the Company shall be obligated hereunder to provide indemnification, exoneration or hold harmless rights for or make any Expense Advances with respect to the Expenses of any Claim, the Company, if appropriate, shall be entitled to assume the defense of such Claim with counsel approved by Indemnitee (which approval shall not be unreasonably withheld) upon the delivery to Indemnitee of written notice of the Company's election to do so. After delivery of such notice, approval of such counsel by Indemnitee and the retention of such counsel by the Company, the Company will not be liable to

Indemnitee under this Agreement for any fees or expenses of separate counsel subsequently employed by or on behalf of Indemnitee with respect to the same Claim; *provided, however*, that (i) Indemnitee shall have the right to employ Indemnitee's separate counsel in any such Claim at Indemnitee's expense and (ii) if (A) the employment of separate counsel by Indemnitee has been previously authorized by the Company, (B) Indemnitee shall have reasonably concluded that there may be a conflict of interest between the Company and Indemnitee in the conduct of any such defense or (C) the Company shall not continue to retain such counsel to defend such Claim, then the fees and expenses of Indemnitee's separate counsel shall be Expenses for which Indemnitee may receive indemnification, exoneration or hold harmless rights or Expense Advances hereunder. The Company shall have the right to conduct such defense as it sees fit in its sole discretion, including the right to settle any claim, action or proceeding against Indemnitee without the consent of Indemnitee, provided that the terms of such settlement include either: (i) a full release of Indemnitee by the claimant from all liabilities or potential liabilities under such claim or (ii), in the event such full release is not obtained, the terms of such settlement do not limit any indemnification, exoneration or hold harmless rights Indemnitee may now, or hereafter, be entitled to under this Agreement, the Company's Certificate of Incorporation, bylaws, any agreement, any vote of stockholders or disinterested directors, the General Corporation Law of the State of Delaware (the "DGCL") or otherwise.

5. Additional Indemnification Rights; Nonexclusivity.

(a) Scope. The Company hereby agrees to indemnify, exonerate and hold harmless the Indemnitee to the fullest extent permitted by law, notwithstanding that such indemnification, exoneration or hold harmless right is not specifically authorized by the other provisions of this Agreement, the Company's Certificate of Incorporation, the Company's bylaws or by statute, a vote of stockholders or a resolution of directors, or otherwise. The rights of indemnification and to receive Expense Advances as provided by this Agreement shall be interpreted independently of, and without reference to, any other such rights to which Indemnitee may at any time be entitled. In the event of any change after the date of this Agreement in any applicable law, statute or rule which expands the right of a Delaware corporation to indemnify, exonerate or hold harmless a member of its board of directors or an officer, employee, agent or fiduciary, it is the intent of the parties hereto that Indemnitee shall enjoy by this Agreement the greater benefits afforded by such change. In the event of any change in any applicable law, statute or rule which narrows the right of a Delaware corporation to indemnify, exonerate or hold harmless a member of its board of directors or an officer, employee, agent or fiduciary, such change, to the extent not otherwise required by such law, statute or rule to be applied to this Agreement, shall have no effect on this Agreement or the parties' rights and obligations hereunder except as set forth in Section 10(a) hereof.

(b) Nonexclusivity. The indemnification, exoneration or hold harmless rights and the payment of Expense Advances provided by this Agreement shall be in addition to any rights to which Indemnitee may be entitled under the Company's Certificate of Incorporation, its bylaws, any other agreement, any vote of stockholders or disinterested directors, the DGCL, or otherwise. The indemnification, exoneration or hold harmless rights and the payment of Expense Advances provided under this Agreement shall continue as to Indemnitee for any action taken or not taken while serving in an indemnified, exonerated or held harmless capacity even though subsequent thereto Indemnitee may have ceased to serve in such capacity.

6. No Duplication of Payments. The Company shall not be liable under this Agreement to make any payment in connection with any Claim made against Indemnitee to the extent Indemnitee has otherwise actually received payment (under any insurance policy, provision of the Company's Certificate of Incorporation, bylaws or otherwise) of the amounts otherwise payable hereunder, except as provided in Section 18 below.

7. Partial Indemnification. If Indemnitee is entitled under any provision of this Agreement to indemnification, exoneration or hold harmless rights by the Company for some or a portion of Expenses incurred in connection with any Claim, but not, however, for the total amount thereof, the Company shall nevertheless indemnify, exonerate or hold harmless Indemnitee for the portion of such Expenses to which Indemnitee is entitled.

8. Mutual Acknowledgment. Both the Company and Indemnitee acknowledge that in certain instances, federal law or applicable public policy may prohibit the Company from indemnifying, exonerating or holding harmless its directors, officers, employees, agents or fiduciaries under this Agreement or otherwise. Indemnitee understands and acknowledges that the Company may be required in the future to undertake with the Securities and Exchange Commission to submit the question of indemnification, exoneration or hold harmless rights to a court in certain circumstances for a determination of the Company's right under public policy to indemnify, exonerate or hold harmless Indemnitee.

9. Liability Insurance. To the extent the Company maintains liability insurance applicable to directors, officers, employees, agents or fiduciaries, Indemnitee shall be covered by such policies in such a manner as to provide Indemnitee the same rights and benefits as are provided to the most favorably insured of the Company's directors who are not employees of the Company, if Indemnitee is a director who is not employed by the Company; or of the Company's officers, if Indemnitee is a director of the Company and is also employed by the Company, or is not a director of the Company but is an officer; or in the Company's sole discretion, if Indemnitee is not an officer or director but is an employee, agent or fiduciary.

10. Exceptions. Notwithstanding any other provision of this Agreement, the Company shall not be obligated pursuant to the terms of this Agreement:

(a) **Excluded Action or Omissions.** To indemnify, exonerate or hold harmless Indemnitee for Expenses resulting from acts, omissions or transactions for which Indemnitee is prohibited from receiving indemnification, exoneration or hold harmless rights under this Agreement or applicable law; *provided, however,* that notwithstanding any limitation set forth in this Section 10(a) regarding the Company's obligation to provide indemnification, exoneration or hold harmless rights to Indemnitee, Indemnitee shall be entitled under Section 3 to receive Expense Advances hereunder with respect to any such Claim unless and until a court having jurisdiction over the Claim shall have made a final judicial determination (as to which all rights of appeal therefrom have been exhausted or lapsed) that Indemnitee has engaged in acts, omissions or transactions for which Indemnitee is prohibited from receiving indemnification under this Agreement or applicable law.

(b) **Claims Initiated by Indemnitee.** To indemnify, exonerate or hold harmless or make Expense Advances to Indemnitee with respect to Claims initiated or brought voluntarily by Indemnitee and not by way of defense, counterclaim or cross claim, except (i) with respect to actions or proceedings brought to establish or enforce an indemnification, exoneration or hold harmless right under this Agreement or any other agreement or insurance policy or under the Company's Certificate of Incorporation or bylaws now or hereafter in effect relating to Claims for Covered Events, (ii) in specific cases if the Board of Directors has approved the initiation or bringing of such Claim or (iii) as otherwise required under Section 145 of the DGCL, regardless of whether Indemnitee ultimately is determined to be entitled to such indemnification, exoneration, hold harmless right, Expense Advances or insurance recovery, as the case may be.

(c) **Lack of Good Faith.** To indemnify, exonerate or hold harmless Indemnitee for any Expenses incurred by Indemnitee with respect to any action instituted (i) by Indemnitee to enforce or interpret this Agreement, if a court having jurisdiction over such action determines as provided in Section 13 hereof that each of the material assertions made by Indemnitee as a basis for such action was not made in good faith or was frivolous or (ii) by or in the name of the Company to enforce or interpret this Agreement, if a court having jurisdiction over such action determines as provided in Section 13 hereof that each of the material defenses asserted by Indemnitee in such action was made in bad faith or was frivolous.

(d) **Claims Under Section 16(b) or Sarbanes-Oxley Act.** To indemnify, exonerate or hold harmless Indemnitee for expenses and the payment of profits arising from the purchase and sale by Indemnitee of securities in violation of Section 16(b) of the Securities Exchange Act of 1934, as amended, or any similar successor statute or (ii) any reimbursement of the Company by Indemnitee of any bonus or other incentive-based or equity-based compensation or of any profits realized by Indemnitee from the sale of securities of the Company, as required in each case under the Exchange Act (including any such reimbursements that arise from an accounting restatement of the Company pursuant to Section 304 of the Sarbanes-Oxley Act of 2002 (the "**Sarbanes-Oxley Act**"), or the payment to the Company of profits arising from the purchase and sale by Indemnitee of securities in violation of Section 306 of the Sarbanes-Oxley Act); *provided, however*, that notwithstanding any limitation set forth in this Section 10(d) regarding the Company's obligation to provide indemnification or exonerate or hold harmless, Indemnitee shall be entitled under Section 3 hereof to receive Expense Advances hereunder with respect to any such Claim unless and until a court having jurisdiction over the Claim shall have made a final judicial determination (as to which all rights of appeal therefrom have been exhausted or lapsed) that Indemnitee has violated said statute.

11. Counterparts. This Agreement may be executed in counterparts and by facsimile or electronic transmission, each of which shall constitute an original and all of which, together, shall constitute one instrument.

12. Binding Effect; Successors and Assigns. This Agreement shall be binding upon, inure to the benefit of and be enforceable by the parties hereto and their respective successors and assigns (including any direct or indirect successor by purchase, merger, consolidation or otherwise to all or substantially all of the business and/or assets of the Company), spouses, heirs, and personal and legal representatives. The Company shall require and cause any successor (whether direct or indirect by purchase, merger, consolidation or otherwise) to all, substantially all, or a substantial part, of the business and/or assets of the Company, by written agreement in form and substance satisfactory to Indemnitee, expressly to

assume and agree to perform this Agreement in the same manner and to the same extent that the Company would be required to perform if no such succession had taken place. This Agreement shall continue in effect regardless of whether Indemnitee continues to serve as a director, officer, employee, agent or fiduciary (as applicable) of the Company or of any other enterprise at the Company's request. [The Company and Indemnitee agree that the Fund Indemnitors (as defined in Section 18 below) are express third party beneficiaries of this Agreement.]²

13. Expenses Incurred in Action Relating to Enforcement or Interpretation. In the event that any action is instituted by Indemnitee under this Agreement or under any liability insurance policies maintained by the Company to enforce or interpret any of the terms hereof or thereof, Indemnitee shall be entitled to be indemnified for all Expenses incurred by Indemnitee with respect to such action (including without limitation attorneys' fees), regardless of whether Indemnitee is ultimately successful in such action, unless as a part of such action a court having jurisdiction over such action makes a final judicial determination (as to which all rights of appeal therefrom have been exhausted or lapsed) that each of the material assertions made by Indemnitee as a basis for such action was not made in good faith or was frivolous; *provided, however*, that until such final judicial determination is made, Indemnitee shall be entitled under Section 3 to receive payment of Expense Advances hereunder with respect to such action. In the event of an action instituted by or in the name of the Company under this Agreement to enforce or interpret any of the terms of this Agreement, Indemnitee shall be entitled to be indemnified, exonerated or held harmless for all Expenses incurred by Indemnitee in defense of such action (including without limitation costs and expenses incurred with respect to Indemnitee's counterclaims and cross-claims made in such action), unless as a part of such action a court having jurisdiction over such action makes a final judicial determination (as to which all rights of appeal therefrom have been exhausted or lapsed) that each of the material defenses asserted by Indemnitee in such action was made in bad faith or was frivolous; *provided, however*, that until such final judicial determination is made, Indemnitee shall be entitled under Section 3 to receive payment of Expense Advances hereunder with respect to such action.

14. Notices. All notices, requests, demands and other communications under this Agreement shall be in writing and shall be deemed duly given (i) if delivered by hand and signed for by the party addressed, on the date of such delivery or (ii) if mailed by domestic certified or registered mail with postage prepaid, on the third business day after the date postmarked. Addresses for notice to either party are as shown on the signature page of this Agreement or as subsequently modified by written notice.

15. Consent to Jurisdiction. The Company and Indemnitee each hereby irrevocably consent to the jurisdiction of the courts of the State of Delaware for all purposes in connection with any action or proceeding which arises out of or relates to this Agreement and agree that any action instituted under this Agreement shall be commenced, prosecuted and continued only in the Court of Chancery of the State of Delaware in and for New Castle County, which shall be the exclusive and only proper forum for adjudicating such a claim.

² **Note to Form:** To be included when applicable.

16. Severability. The provisions of this Agreement shall be severable in the event that any of the provisions hereof (including any provision within a single section, paragraph or sentence) are held by a court of competent jurisdiction to be invalid, void or otherwise unenforceable, and the remaining provisions shall remain enforceable to the fullest extent permitted by law. Furthermore, to the fullest extent possible, the provisions of this Agreement (including without limitation each portion of this Agreement containing any provision held to be invalid, void or otherwise unenforceable, that is not itself invalid, void or unenforceable) shall be construed so as to give effect to the intent manifested by the provision held invalid, illegal or unenforceable.

17. Choice of Law. This Agreement, and all rights, remedies, liabilities, powers and duties of the parties to this Agreement, shall be governed by and construed in accordance with the laws of the State of Delaware without regard to principles of conflicts of laws.

18. Primacy of Indemnification; Subrogation.

(a) [The Company hereby acknowledges that Indemnitee has or may in the future have certain indemnification, exoneration, hold harmless or Expense advancement rights and/or insurance provided by [Fund] and certain of its affiliates (collectively, the "Fund Indemnitors"). The Company hereby agrees (i) that it is the indemnitor of first resort (*i.e.*, its obligations to Indemnitee are primary and any obligation of the Fund Indemnitors to advance Expenses or to provide indemnification, exoneration or hold harmless rights for the same Expenses incurred by Indemnitee are secondary), (ii) that it shall be required to advance the full amount of Expenses incurred by Indemnitee and shall be liable for the full amount of all Expenses, to the extent legally permitted and as required by the Certificate of Incorporation or bylaws of the Company (or any agreement between the Company and Indemnitee), without regard to any rights Indemnitee may have against the Fund Indemnitors, (iii) that it irrevocably waives, relinquishes and releases the Fund Indemnitors from any and all claims against the Fund Indemnitors for contribution, subrogation or any other recovery of any kind in respect thereof and (iv) if any Fund Indemnitor is a party to or a participant in a legal proceeding, which participation or involvement arises solely and exclusively as a result of Indemnitee's service to the Company as a director of the Company, then such Fund Indemnitor shall be entitled to all of the indemnification rights and remedies under this Agreement to the same extent as Indemnitee. The Company further agrees that no advancement or payment by the Fund Indemnitors on behalf of Indemnitee with respect to any Claim for which Indemnitee has sought indemnification, exoneration or hold harmless rights from the Company shall affect the foregoing and the Fund Indemnitors shall have a right to receive from the Company, contribution and/or be subrogated, to the extent of such advancement or payment to all of the rights of recovery of Indemnitee against the Company.]³

(b) [Except as provided in Section 18(a) above,][I]n the event of payment under this Agreement, the Company shall be subrogated to the extent of such payment to all of the rights of recovery of Indemnitee from any insurance policy purchased by the Company, who shall execute all documents required and shall do all acts that may be necessary to secure such rights and to enable the Company effectively to bring suit to enforce such rights. In no event, however, shall the Company or any other person have any right of recovery, through subrogation or otherwise, against (i) Indemnitee, [or] (ii) [any Fund Indemnitor or (iii)]⁴ any insurance policy purchased or maintained by Indemnitee [or any Fund Indemnitor].

³ **Note to Form:** To be included when applicable.

⁴ **Note to Form:** To be included when applicable.

19. Amendment and Termination. No amendment, modification, termination or cancellation of this Agreement shall be effective unless it is in writing signed by both the parties hereto. No waiver of any of the provisions of this Agreement shall be deemed to be or shall constitute a waiver of any other provisions hereof (whether or not similar), nor shall such waiver constitute a continuing waiver.

20. Integration and Entire Agreement. This Agreement sets forth the entire understanding between the parties hereto and supersedes and merges all previous written and oral negotiations, commitments, understandings and agreements relating to the subject matter hereof between the parties hereto, including any existing director or officer indemnification agreement; *provided, however*, that this Agreement is a supplement to and in furtherance of the Certificate of Incorporation, the bylaws, any directors and officers insurance maintained by the Company and applicable law, and shall not be deemed a substitute therefor, nor to diminish or abrogate any rights of Indemnitee thereunder.

21. No Construction as Employment Agreement. Nothing contained in this Agreement shall be construed as giving Indemnitee any right to employment by the Company or any of its subsidiaries or affiliated entities.

22. Additional Acts. If for the validation of any of the provisions in this Agreement any act, resolution, approval or other procedure is required, the Company undertakes to cause such act, resolution, approval or other procedure to be affected or adopted in a manner that will enable the Company to fulfill its obligations under this Agreement.

(The remainder of this page is intentionally left blank.)

IN WITNESS WHEREOF, the parties hereto have executed this Indemnification Agreement as of the date first above written.

4D MOLECULAR THERAPEUTICS, INC.

By: _____
AUTHORIZED OFFICER

Address:
5858 Horton Street #455
Emeryville, CA 94608

AGREED TO AND ACCEPTED BY:

INDEMNITEE:

By: _____
«INDEMNITEE»

Date: «Date»

Address:
«Address»

EXHIBIT A

Form of Undertaking

**AFFIRMATION AND UNDERTAKING FOR ADVANCE OF EXPENSES
PURSUANT TO SECTION 145(e) OF THE GENERAL CORPORATION LAW
OF THE STATE OF DELAWARE**

Pursuant to Section 145(e) of the General Corporation Law of the State of Delaware (the “**DGCL**”), Section 9.3 of the Amended and Restated Bylaws (the “**Bylaws**”) of 4D Molecular Therapeutics, Inc. (the “**Company**”), and Section 3(a) of my Indemnification Agreement with the Company (the “**Indemnification Agreement**”), I understand that I must provide a written undertaking in order for the Company to make Expense Advances to me in connection with [NAME OF PROCEEDING], as well as in any related action, suit or proceeding that is threatened, pending or may be filed in the future in which I am a party, a witness or other participant.

The capitalized terms used herein and not otherwise defined shall have the meanings specified in the Indemnification Agreement.

I hereby affirm my good-faith belief that I have met the standard of conduct for indemnification imposed by Section 145(d) of the DGCL. I affirm that in connection with the matters for which I seek Expense Advances, I have acted in good faith and in a manner I reasonably believed to be in or not opposed to the best interests of the Company, and with respect to any criminal action or proceeding, had no reasonable cause to believe that such conduct was unlawful.

I hereby undertake to repay the Expense Advances if it is ultimately determined that I am not entitled to be indemnified, exonerated or held harmless therefor by the Company under Section 145 of the DGCL, Article IX of the Bylaws or the Indemnification Agreement.

This undertaking is a general, unsecured obligation, and no interest shall be charged hereon.

I have executed this Affirmation and Undertaking on this ____ day of _____, 20__.

Agreement Control No. 2014-03-0089

UNIVERSITY OF CALIFORNIA, BERKELEY

OFFICE OF TECHNOLOGY LICENSING



EXCLUSIVE LICENSE AND BAILMENT AGREEMENT

BETWEEN

4D MOLECULAR THERAPEUTICS, LLC

AND

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

FOR

**ADENO-ASSOCIATED VIRUS SEROTYPE 2 (AAV2) CAPSID MUTANTS WITH
NOVEL PROPERTIES FOR ENHANCED PERFORMANCE FOR GENE THERAPY**

UC Case No.: B03-104

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***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

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UNIVERSITY OF CALIFORNIA, BERKELEY

OFFICE OF TECHNOLOGY LICENSING



**EXCLUSIVE LICENSE AND BAILMENT AGREEMENT
FOR
ADENO-ASSOCIATED VIRUS SEROTYPE 2 (AAV2) CAPSID MUTANTS
WITH NOVEL PROPERTIES FOR ENHANCED PERFORMANCE FOR GENE THERAPY**

UC Case No.: B03-104

This exclusive license agreement (“Agreement”) is effective December 19, 2013 (“Effective Date”), by and between **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA**, a California corporation, whose legal address is 1111 Franklin Street, 12th Floor, Oakland, California 94607-5200, acting through its Office of Technology Licensing, at the University of California, Berkeley, 2150 Shattuck Avenue, Suite 510, Berkeley, CA 94704-1347 (“REGENTS”) and **4D MOLECULAR THERAPEUTICS LLC**, a Delaware limited liability company having a principal place of business at 19 Rima Court, Danville, CA 94526 (“LICENSEE”). The parties agree as follows:

1. BACKGROUND

- 1.1 An invention, generally described as “[***]” and disclosed in REGENTS’ Case No. B03-104 (the “INVENTION”), was jointly made in the course of research at the University of California, Berkeley by [***], employed by REGENTS, and at Integrative Gene Therapeutics, San Diego, California (“IGT”) by [***], employed by Integrative Gene Therapeutics.
- 1.2 REGENTS’ employees [***] have assigned to REGENTS their undivided interest in PATENT RIGHTS (as defined below).
- 1.3 IGT’s employee [***] has assigned his undivided interest to IGT in PATENT RIGHTS.
- 1.4 REGENTS and IGT entered into an Interinstitutional Agreement (the “IIA”) on August 28, 2003, Agreement Control No.: 2004-18-0020, that is attached to this Agreement as Exhibit A, under which IGT agrees not to license its undivided interest in PATENT RIGHTS during the term of the IIA.
- 1.5 LICENSEE entered into a letter agreement with REGENTS effective March 5, 2013, terminating on December 5, 2013, for the purpose of evaluating the INVENTION and granting LICENSEE an exclusive right to negotiate an exclusive license in PATENT RIGHTS to the INVENTION, which letter agreement covers LICENSEE’s commitment to reimburse REGENTS’ patent costs during such period.

[***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

- 1.6 LICENSEE has provided REGENTS with a commercialization plan for the INVENTION and business strategy in order to evaluate its capabilities as a LICENSEE.
- 1.7 REGENTS, IGT and LICENSEE wish to have the INVENTION perfected and marketed as soon as reasonably practicable so that products resulting therefrom may be available for public use and benefit.
- 1.8 LICENSEE wishes to acquire, and REGENTS wishes to grant to LICENSEE, an exclusive license under PATENT RIGHTS and an exclusive bailment of the BIOLOGICAL MATERIAL included in the REGENTS' PROPERTY RIGHTS for the purpose of undertaking development and to make, have made, use, sell, offer for sale, import, and export LICENSED PRODUCTS as defined below.
- 1.9 REGENTS and LICENSEE are simultaneously entering into a license agreement covering the inventions under REGENTS' Case No. B13-135 (the "OTHER LICENSE AGREEMENT").

2. DEFINITIONS

- 2.1 "PATENT RIGHTS" means the intellectual property rights in the following patents and patent applications:
 - 2.1.1 [***];
 - 2.1.2 [***];
 - 2.1.3 [***];
 - 2.1.4 [***];
 - 2.1.5 [***];
 - 2.1.6 [***];
 - 2.1.7 [***];
 - 2.1.8 [***];
 - 2.1.9 [***];
 - 2.1.10 [***]; and
 - 2.1.11 All continuing applications of the foregoing, including divisionals, substitutions, extensions and continuation-in-part applications (only to the

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extent, however, that claims in the continuation-in-part applications are entitled to the priority filing date of the parent patent application); any patents issuing on said application or continuing applications, including all reexaminations, reissues, and extensions thereof; and any corresponding foreign patents or applications.

- 2.2 “LICENSED PRODUCTS” means all kits, compositions of matter, articles of manufacture, materials, and products, the manufacture, use, SALE, offer for SALE, or import of which: (a) would require the performance of the LICENSED METHOD; or (b) but for the license granted pursuant to this Agreement, would infringe, or contribute to or induce the infringement of, a VALID CLAIM of any issued, unexpired patent under PATENT RIGHTS or a VALID CLAIM being prosecuted in a pending patent application under PATENT RIGHTS.
- 2.3 “LICENSED METHOD” means any process or method, the use or practice of which, but for the license pursuant to this Agreement, would infringe, or contribute to or induce the infringement of, a VALID CLAIM of any issued patent or pending patent application under PATENT RIGHTS in that country in which the LICENSED METHOD is used or practiced.
- 2.4 “VALID CLAIM” means (i) a claim in an issued and unexpired patent included in the PATENT RIGHTS that has not been disclaimed, abandoned or withdrawn and has not been held unenforceable or invalid by a final judgment of a court or other governmental agency of competent jurisdiction from which no appeal can be or is taken, and has not been admitted to be invalid or unenforceable through reissue or disclaimer or otherwise, or (ii) a claim in a pending patent application included within the PATENT RIGHTS that has been filed in good faith and has not been abandoned or finally disallowed without the possibility of appeal or refiling, which application has not been pending for more than [***] ([***) years after its priority date, provided that for clarity, any claim of a pending patent application that is pending for more than [***] ([***) years after its priority date shall be eligible to become a VALID CLAIM if it later issues and otherwise falls within subsection (i).
- 2.5 “LICENSED FIELD OF USE” means all fields of use, except the ophthalmic field of use.
- 2.6 “NET SALES” means the gross invoice price charged by, and the fair market value of non-cash consideration paid to, LICENSEE for SALES of LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS, less the sum of the following actual and customary deductions where applicable: (i) the actual amount of write-offs for bad debts (in accordance with generally accepted accounting principles and that would reasonably be taken by a similarly situated company) related to such SALES; (ii) cash, prompt pay, trade or quantity discounts; (iii) sales tax, use tax, consumption tax, Deductible Value Added Tax, tariffs, import/export duties or other excise taxes when included in gross sales, but not income taxes derived from such sales; (iv) transportation charges; and

[***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

(v) allowances or credits to customers because of rejections or returns. For purposes of calculating NET SALES, NET SALES shall not include any SALE of LICENSED PRODUCTS, LICENSED SERVICES, or LICENSED METHODS used for development purposes (including, without limitation for clinical studies) or provided as samples or free goods (including, without limitation, product transferred in connection with patient assistance programs or other charitable purposes); and a SALE to a sublicensee that is not intended for end use shall not be included in NET SALES. "Deductible Value Added Tax" is value added tax to the extent that is not subject to a tax credit, refund or deduction by a taxing authority.

In the event that LICENSED PRODUCTS, LICENSED SERVICES or LICENSED METHODS are COMBINATION PRODUCTS, the NET SALES of such COMBINATION PRODUCT, for the purposes of determining royalty payments pursuant to this Agreement, shall be determined by multiplying the NET SALES of the COMBINATION PRODUCT (as defined below) during the applicable royalty reporting period, by the fraction $A/(A+B)$, where A is the fair market value of the LICENSED PRODUCTS, LICENSED SERVICES or LICENSED METHODS, and B is the fair market value of all OTHER COMPONENTS included in the COMBINATION PRODUCT. If a COMBINATION PRODUCT is sold, whether or not the OTHER COMPONENTS are also sold separately, LICENSEE shall make a good faith determination of the respective fair market values of the LICENSED PRODUCT, LICENSED SERVICES or LICENSED METHODS and all OTHER COMPONENTS included in the COMBINATION PRODUCT, and shall notify REGENTS of such determination and provide REGENTS with data to support such determination.

- 2.7 "COMBINATION PRODUCT" means a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD that incorporates at least one OTHER COMPONENT. For clarity, all references to "LICENSED PRODUCTS, LICENSED SERVICES or LICENSED METHODS" in this Agreement shall be deemed to include COMBINATION PRODUCTS.
- 2.8 "OTHER COMPONENT" means a proprietary active therapeutic ingredient or a delivery device, in each case that is not itself a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD.
- 2.9 "AFFILIATE" of LICENSEE means any entity that, directly or indirectly, Controls LICENSEE, is Controlled by LICENSEE, or is under common Control with LICENSEE. "Control" means (i) having the actual, present capacity to elect a majority of the directors of such affiliate, (ii) having the power to direct at least fifty percent (50%) of the voting rights entitled to elect directors, or (iii) in any country where the local law will not permit foreign equity participation of a majority, ownership or control, directly or indirectly, of the maximum percentage of such outstanding stock or voting rights permitted by local law.

[***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

- 2.10 “LICENSED TERRITORY” means United States of America, its territories and possessions, and subject to Paragraph 14.4, any foreign countries where PATENT RIGHTS exist.
- 2.11 “SALE” means, for LICENSED PRODUCTS and LICENSED SERVICES, the act of selling, leasing or otherwise transferring, providing, or furnishing such product or service, and for LICENSED METHODS, the act of performing such method for any consideration. Correspondingly, “SELL” means to make or cause to be made a SALE, and “SOLD” means to have made or caused to be made a SALE.
- 2.12 “LICENSED SERVICE” means a service provided using LICENSED PRODUCTS or LICENSED METHODS.
- 2.13 “NON-ROYALTY SUBLICENSE REVENUE” means any cash consideration, and subject to Paragraph 4.3(b), the cash equivalent of all other consideration, received by LICENSEE under each sublicense for the grant of rights under the PATENT RIGHTS, but excluding: (a) any royalty payments on sales of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS by a sublicensee (which shall be included as EARNED ROYALTY SUBLICENSE REVENUE); (b) any amounts paid by a sublicensee as bona fide reimbursement for research and development costs at fair market value for materials and full time equivalents; (c) bona fide loans or any payments in consideration for a grant of equity of the LICENSEE at fair market value; (d) amounts paid for supplies of product or other tangible materials; (e) amounts paid as reimbursement for expenses directly related to the pursuit, maintenance, and/or defense of PATENT RIGHTS; (f) milestone payments by a sublicensee for a product, service, or method that is not a LICENSED PRODUCT, LICENSED SERVICE, or LICENSED METHOD; (g) payments by a sublicensee for use of the BIOLOGICAL MATERIALS to identify or optimize products, services, or methods that are not LICENSED PRODUCTS, LICENSED SERVICES, or LICENSED METHODS; (h) withholding taxes and any other amounts by a sublicensee from amounts otherwise payable to LICENSEE under such sublicense agreement other than past due payments; and (i) payments for the supply of LICENSED PRODUCTS or materials used in the performance of LICENSED SERVICES or LICENSED METHODS. Without limiting the foregoing, the parties agree that NON-ROYALTY SUBLICENSE REVENUE shall not include consideration received by LICENSEE from a sublicensee that is not received in consideration for the grant of rights under the PATENT RIGHTS to make, use, offer for SALE, import, and SELL LICENSED PRODUCTS and LICENSED SERVICES, and to practice LICENSED METHODS.
- 2.14 “EARNED ROYALTY SUBLICENSE REVENUE” means any royalty payments received by LICENSEE pursuant to an agreement between LICENSEE and a sublicensee pursuant to which such sublicensee receives a sublicense under the PATENT RIGHTS, on SALES of LICENSED PRODUCTS, LICENSED

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SERVICES and LICENSED METHODS by such sublicensee (which sales shall not be included as NET SALES).

- 2.15 “FIRST QUALIFIED ROUND” occurs on the first date on which the LICENSEE has received, in aggregate in excess of [***] US Dollars (\$[***]) from any one of or combination of equity financing, convertible debt financing, unrestricted grants, or the acquisition of all or substantially all of LICENSEE’s limited liability company interests, assets or business; *provided, however*, that [***].
- 2.16 “FOUNDERS” means [***] and [***].
- 2.17 “PHASE I CLINICAL TRIAL” means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(a).
- 2.18 “PHASE IIB CLINICAL TRIAL” means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(b) and that is designed to support and immediately precede the initiation of a Phase III Clinical Trial without any further phase II trials by evaluating the dose-dependent effectiveness of a pharmaceutical product for a particular indication or indications in patients with the disease or condition under study and to determine the common side effects and risks associated with the pharmaceutical product.
- 2.19 “PHASE III CLINICAL TRIAL” means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(c).
- 2.20 “REGENTS’ PROPERTY RIGHTS” means all of REGENTS’ personal property rights in the tangible property in the INVENTION licensed hereunder and to the BIOLOGICAL MATERIALS. REGENTS’ PROPERTY RIGHTS do not include PATENT RIGHTS.
- 2.21 “BIOLOGICAL MATERIALS” shall have the meaning set forth in Article 1 of the Letter Agreement between REGENTS and LICENSEE, dated as of even date herewith (the “MTA”).

3. GRANT

- 3.1 (a) Subject to the limitations set forth in this Agreement, and the rights reserved in Paragraph 3.3, REGENTS hereby grants and LICENSEE hereby accepts an exclusive license under PATENT RIGHTS to make, use, offer for SALE, import, and SELL LICENSED PRODUCTS and LICENSED SERVICES, and to practice LICENSED METHODS, in the LICENSED FIELD OF USE in the LICENSED TERRITORY.
- (b) Subject to the limitations set forth in this Agreement, REGENTS hereby grants and LICENSEE hereby accepts an exclusive bailment and license under REGENTS’ PROPERTY RIGHTS to possess, make and use the BIOLOGICAL MATERIAL. LICENSEE acknowledges that the

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REGENTS is and will remain the sole owner of the BIOLOGICAL MATERIAL and the title of the material is not transferred to LICENSEE under this Agreement.

- (c) REGENTS have provided the LICENSEE with BIOLOGICAL MATERIAL in quantities as set forth in the MTA. No additional obligation is required of REGENTS' with respect to bailment of the BIOLOGICAL MATERIAL.

This Agreement is subject to IGT's rights under the IIA.

- 3.2 The licenses under Paragraph 3.1 will be exclusive for a term commencing on the Effective Date and ending on the date of the last-to-expire VALID CLAIM under PATENT RIGHTS.
- 3.3 Nothing in this Agreement will be deemed to limit the right of REGENTS and IGT to publish any and all technical data resulting from any research performed by REGENTS and IGT relating to the INVENTION and the BIOLOGICAL MATERIAL. REGENTS and IGT expressly reserve the right to use the INVENTION, the BIOLOGICAL MATERIAL and related technology for its educational and research purposes; to disseminate the BIOLOGICAL MATERIAL and other tangible materials associated with, or required to practice the INVENTION and/or the PATENT RIGHTS to researchers at nonprofit institutions for their educational and research purposes and to permit other nonprofit institutions to use such BIOLOGICAL MATERIAL to practice the PATENT RIGHTS for education and research purposes.
- 3.4 This Agreement will terminate immediately if LICENSEE files a claim asserting that any portion of the PATENT RIGHTS is invalid or unenforceable where the filing is by the LICENSEE, a third party on behalf of the LICENSEE, or a third party at the written urging of the LICENSEE.
- 3.5 LICENSEE will have a continuing responsibility to keep REGENTS informed of the large/small entity status, as defined in 15 U.S.C. 632, of itself and its sublicensees.

4. SUBLICENSES

- 4.1 REGENTS also grants to LICENSEE the right to sublicense to AFFILIATES and third parties the right to make, use, offer for SALE, import, and SELL LICENSED PRODUCTS and LICENSED SERVICES, and to practice LICENSED METHODS, provided that LICENSEE has exclusive rights under this Agreement at the time of sublicensing. LICENSEE will notify REGENTS of each sublicense granted hereunder and furnish to REGENTS a copy of each such sublicense agreement, which shall be treated as confidential information of LICENSEE. Every such sublicense will include:

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- (a) a statement setting forth the term after which LICENSEE's exclusive rights, privileges, and license hereunder will expire;
 - (b) as applicable, all the rights of, and require the performance of all the obligations due to, REGENTS under this Agreement, other than those rights and obligations specified in Article 5 (License Issue Fee) and Article 6 (Royalties), for which LICENSEE shall remain responsible; and
 - (c) the same provision for indemnification of REGENTS as has been provided for in this Agreement.
- 4.2 To the extent permitted under the sublicense agreement, a sublicensee shall have the right to grant further sublicenses to its AFFILIATE and third parties to the extent such sublicensee deems such further sublicense to be commercially reasonable, useful or necessary for the development and/or commercialization of LICENSED PRODUCT(S) or LICENSED METHOD(S) in accordance with this Agreement; provided that (i) such further sublicense is subject to a written sublicense agreement and is bound by all of the applicable terms, conditions, obligations, restrictions and other covenants of this Agreement that protect or benefit the REGENTS' rights and interests under this Agreement, and (ii) the sublicensee shall, within [***] ([***)] days after issuing any further sublicense, furnish to LICENSEE for delivery to REGENTS, subject to any confidentiality provisions with third parties, all material terms of any such sublicenses, pertaining to the REGENTS' interests, including the sublicensee's name and address, and indemnification of REGENTS as provided in this Agreement.
- 4.3 LICENSEE will pay to REGENTS (i) [***] percent ([***)% of NON-ROYALTY SUBLICENSE REVENUE and (ii) [***] percent ([***)% of EARNED ROYALTY SUBLICENSE REVENUE, provided that in no event will the EARNED ROYALTY SUBLICENSE REVENUE due to REGENTS on sales of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS by a sublicensee be less than [***] percent ([***)% of net sales of such sublicensee (which for purposes of this Paragraph 4.3 shall be calculated as though such sublicensee were LICENSEE under Paragraph 2.6.
- (a) In the event LICENSEE sublicenses the PATENT RIGHTS along with its own patent rights or those of other third parties, LICENSEE may reasonably determine in good faith the percentage of compensation received under such sublicense that represents consideration due for the grant of the rights under the PATENT RIGHTS, which percentage will be based upon the value of the PATENT RIGHTS licensed to the sublicensee relative to the value of LICENSEE's own patent rights or the other third party patent rights licensed to the sublicensee. When making payment under this Paragraph 4.3(a), LICENSEE shall provide REGENTS with all supporting information and documentation used to determine any such percentage (or shall reference previously provided supporting information and documentation).

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Notwithstanding the foregoing, in no case will LICENSEE be permitted to reduce the compensation to REGENTS under this Paragraph 4.3(a) in connection with LICENSEE's own patent rights or those of third parties by more than [***] percent ([***]%).

- (b) If the consideration received is equity and approval to accept equity is granted by REGENTS, then the LICENSEE will transfer [***] percent ([***]%) of the equity LICENSEE receives to REGENTS or REGENTS' nominee. REGENTS will promptly notify the LICENSEE upon REGENTS' Office of the President's approval for the equity. If equity is not accepted, then the LICENSEE will pay REGENTS' portion in cash once the equity is liquidated.
 - (c) LICENSEE shall not be required to pay REGENTS more than [***] percent ([***]%) of NON-ROYALTY SUBLICENSE REVENUE and [***] percent ([***]%) of EARNED ROYALTY SUBLICENSE REVENUE even if LICENSEE sublicenses the PATENT RIGHTS under this Agreement and the patent rights under the OTHER LICENSE AGREEMENT. All amounts paid under this Paragraph 4.3 shall be credited against amounts due for the same LICENSED PRODUCT, LICENSED METHOD or LICENSED SERVICE under Paragraph 4.3 of the OTHER LICENSE AGREEMENT.
- 4.4 AFFILIATES will have no licenses under PATENT RIGHTS except as granted by sublicense pursuant to this Agreement.
- 4.5 For the purposes of this Agreement, the activities of all sublicensees pursuant to any sublicense shall be deemed to be the activities of LICENSEE, for which LICENSEE shall be responsible.
- 4.6 LICENSEE will collect payment of all monies and other consideration due REGENTS from sublicensees, and deliver all reports due REGENTS and received from sublicensees.
- 4.7 Upon termination of this Agreement for any reason, all sublicenses that are granted by LICENSEE pursuant to this Agreement, where the sublicensee is in compliance with its sublicense agreement as of the date of such termination, will remain in effect and will be assigned to REGENTS, except that REGENTS will not be bound to perform any duties or obligations set forth in any sublicenses that extend beyond the duties and obligations of REGENTS set forth in this Agreement.
- 4.8 If REGENTS (to the extent of the actual knowledge of the licensing professional responsible for administration of this case) discovers, or a third party discovers and notifies that licensing professional, that the INVENTION is [***] for an application covered by the LICENSED FIELD OF USE, but for which LICENSED PRODUCTS have not been developed or are not currently under development by LICENSEE, then REGENTS, as represented by the Office of Technology

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Licensing, shall give written notice to LICENSEE, except for: (1) information that is subject to restrictions of confidentiality with third parties, and (2) information which originates with REGENTS' personnel who do not assent to its disclosure to LICENSEE. REGENTS shall endeavor to provide to LICENSEE, at a minimum, a description of the nature and scope of the proposed sublicense sufficient for LICENSEE to evaluate its desire to develop and commercialize products for the relevant application as provided in this Paragraph 4.8.

LICENSEE shall have [***] ([***)] days to give REGENTS written notice stating whether LICENSEE elects to develop LICENSED PRODUCTS for such application.

If LICENSEE elects to develop and commercialize the proposed LICENSED PRODUCTS for such application, LICENSEE shall submit progress reports with respect thereto to REGENTS pursuant to Article 8.

If LICENSEE elects not to develop and commercialize the proposed LICENSED PRODUCTS for such application, REGENTS may seek a third party(ies) to develop and commercialize the proposed LICENSED PRODUCTS for such application. If REGENTS is successful in finding a third party, it shall refer such third party to LICENSEE. If the third party requests a sublicense under this Agreement for such application, then LICENSEE shall report the request to REGENTS within [***] ([***)] days from the date of such written request. If the request results in a sublicense, then LICENSEE shall notify REGENTS pursuant to Paragraph 4.1.

If LICENSEE refuses to grant a sublicense to such third party, then within [***] ([***)] days after such refusal, LICENSEE shall submit to REGENTS a report specifying the license terms proposed by the third party and a written justification for LICENSEE's refusal to grant the proposed sublicense. If REGENTS, [***], determines that [***], then REGENTS shall [***], provided that [***].

5. LICENSE ISSUE FEE

5.1 LICENSEE will pay to REGENTS a non-creditable, non-refundable license issue fee as follows:

- (a) Five Thousand U.S. Dollars (\$5,000) within [***] ([***)] days following the Effective Date of this Agreement;
- (b) If approval to accept equity in LICENSEE is granted by REGENTS in accordance with this Agreement, then within [***] ([***)] days following the date on which the ACCEPTANCE NOTICE (as defined below) is received by the LICENSEE, LICENSEE shall issue to REGENTS' nominee (under the terms of a mutually agreed upon unit purchase agreement to be executed by the parties), an interest in LICENSEE (a "MEMBERSHIP INTEREST") which shall be non-voting, with an allocation percentage with

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respect to profits and losses equal to three percent (3%) as of close of the FIRST QUALIFIED ROUND; if all or a portion of the FIRST QUALIFIED ROUND involves convertible securities which will not convert into MEMBERSHIP INTERESTS until a subsequent financing event, then at the time of the conversion of those securities into MEMBERSHIP INTERESTS, the LICENSEE shall issue additional MEMBERSHIP INTERESTS to REGENTS such that REGENTS' allocation percentage with respect to profits and losses continues to equal three percent (3%) as of the FIRST QUALIFIED ROUND (following the conversion of any convertible securities such as convertible debt issued at the FIRST QUALIFIED ROUND). LICENSEE further agrees that as holders of MEMBERSHIP INTERESTS REGENTS shall receive the same anti-dilution treatment as any other MEMBERSHIP INTERESTS held by either of the FOUNDERS as of the date of this Agreement. REGENTS may transfer or direct LICENSEE to transfer an inventor share portion of the MEMBERSHIP INTERESTS to be issued pursuant to this Section 5.1(b) under REGENTS' patent policy of the shares otherwise due to REGENTS to the REGENTS' inventors of PATENT RIGHTS notwithstanding the provisions of other contracts associated with the transfer of the shares.

LICENSEE will promptly notify REGENTS following the close of the FIRST QUALIFIED ROUND. Following receipt of notice of the closing of the FIRST QUALIFIED ROUND, REGENTS will promptly notify the LICENSEE upon REGENTS' Office of the President's approval for the equity (the "ACCEPTANCE NOTICE"). If REGENTS' Office of the President does not provide an ACCEPTANCE NOTICE to LICENSEE within [***] ([***)] days following the close of the FIRST QUALIFIED ROUND, then Fifty Thousand U.S. Dollars (\$50,000) shall be due [***] in lieu of the MEMBERSHIP INTERESTS to be issued under this Section 5.1(b).

- 5.2 LICENSEE will also pay to REGENTS a license maintenance fee of Five Thousand U.S. Dollars (\$5,000) on the one (1) year anniversary date of the Effective Date and on each anniversary of the Effective Date thereafter. Notwithstanding the foregoing, the license maintenance fee will not be due and payable on any anniversary of the Effective Date, if on such date the LICENSEE or a sublicensee is selling or otherwise exploiting LICENSED PRODUCTS or LICENSED METHODS, and LICENSEE pays an earned royalty to REGENTS on the NET SALES of such LICENSED PRODUCTS or LICENSED METHODS or a payment on EARNED ROYALTY SUBLICENSE REVENUE.

6. ROYALTIES

- 6.1 LICENSEE will pay to REGENTS earned royalties at the rate of [***] percent ([***)% of NET SALES of LICENSEE, subject to the following:

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- (a) If LICENSEE is required to make any payment (including royalties or other license fees) to a third party to obtain any intellectual property rights in the absence of which LICENSEE could not practice PATENT RIGHTS, such third party payments will be credited against royalties owed hereunder by LICENSEE to REGENTS, provided that in no one [***] will the total of such credits reduce earned royalties owed by LICENSEE to REGENTS by more than [***] percent ([***]%).
- (b) In the event a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD are SOLD to end users, and the total combined royalty burden to LICENSEE on NET SALES (including royalties due to REGENTS under this Agreement and royalties due to third parties on such NET SALES) exceeds [***] percent ([***]%), the earned royalty due to REGENTS will be adjusted, according to the following formula, [***]:

$$\text{Adjusted royalty} = [***]$$

For example, [***].

- (c) Only one royalty will be due to REGENTS on any given LICENSED PRODUCT, LICENSED METHOD and LICENSED SERVICE. All amounts paid under this Paragraph 6.1 shall be credited against amounts due for the same LICENSED PRODUCT, LICENSED METHOD or LICENSED SERVICE under Paragraph 6.1 of the OTHER LICENSE AGREEMENT.

- 6.2 Royalties accruing to REGENTS will be paid to REGENTS [***] within [***] ([***)] days after the end of each [***].
- 6.3 Royalties will be payable on NET SALES of LICENSED PRODUCTS, LICENSED METHODS and LICENSED SERVICES covered by VALID CLAIMS of both pending patent applications and issued patents.
- 6.4 LICENSEE will pay to REGENTS milestone payments as follows, provided that all amounts paid under this Paragraph 6.4 shall be credited against amounts due with respect to NON-ROYALTY SUBLICENSE REVENUE pursuant to Paragraph 4.3:
 - (a) LICENSEE shall pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD and;
 - (b) LICENSEE shall pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD;

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- (c) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***]) within [***] ([***) days of [***] for the first LICENSED PRODUCT or LICENSED METHOD;
- (d) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***]) within [***] ([***) days of [***] for the first LICENSED PRODUCT or LICENSED METHOD;
- (e) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***]) within [***] ([***) days of [***] for the first LICENSED PRODUCT or LICENSED METHOD; and
- (f) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***]) within [***] ([***) days of [***] for the first LICENSED PRODUCT or LICENSED METHOD, [***].

Only the milestones listed in this Paragraph 6.4 will be due on any given LICENSED PRODUCT or LICENSED METHOD, even if such milestone is payable under this Agreement and under the OTHER LICENSE AGREEMENT. All amounts paid under this Paragraph 6.4 shall be credited against amounts due for the same LICENSED PRODUCT or LICENSED METHOD under Paragraph 6.4 of the OTHER LICENSE AGREEMENT.

- 6.5 Beginning in the first calendar year after the year in which the first occurrence of NET SALES takes place, and each succeeding calendar year thereafter, LICENSEE will pay to the REGENTS a minimum annual royalty of [***] U.S. Dollars (\$[***]), increasing by [***] Dollars (\$[***]) every year thereafter but capped at a total of One Hundred Thousand Dollars (\$100,000) per year in minimum royalties for the remainder of the term of this Agreement. This minimum annual royalty will be paid to REGENTS by [***] of the year following each applicable calendar year and will be credited against by the earned royalties (including royalty payments based on NET SALES and payments based on EARNED ROYALTY SUBLICENSE REVENUE due pursuant to Sections 6.1 and 4.3, respectively) paid for the [***] calendar year for which the minimum payment is made, whether under this Agreement or the OTHER LICENSE AGREEMENT.

Only one minimum annual royalty will be due under this Agreement and under the OTHER LICENSE AGREEMENT. All amounts paid under this Paragraph 6.5 shall be credited against amounts due under Paragraph 6.5 of the OTHER LICENSE AGREEMENT.

- 6.6 All payments due REGENTS will be payable in United States dollars. When LICENSED PRODUCTS, LICENSED SERVICES, or LICENSED METHODS are SOLD for monies other than United States dollars, earned royalties will first be determined in the foreign currency of the country in which the SALE was made and then converted into equivalent United States dollars. The exchange rate will be that rate quoted in the *Wall Street Journal* on the last business day of the reporting period.

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- 6.7 In the event that any royalties or other payments due to REGENTS are subject to withholding tax required by applicable law to be paid by LICENSEE to the taxing authority of any foreign country on REGENTS' behalf, LICENSEE may deduct the amount of such tax from the applicable royalties or other payment otherwise payable to REGENTS. In such event, LICENSEE shall pay the taxes to the proper taxing authority and shall send evidence of the obligation together with proof of payment to REGENTS following such payment and shall reasonably cooperate with REGENTS in its efforts to avoid or minimize such withholding obligations and/or to obtain credit for payment thereof. To the extent that such amounts are so withheld and remitted to the proper taxing authority by LICENSEE, such withheld amounts shall be treated for all purposes of this Agreement as having been paid to the party in respect of whom such deduction and withholding was made. LICENSEE will be responsible for all bank transfer charges.
- 6.8 LICENSEE will make all payments under this Agreement by check payable to "The Regents of the University of California" and sent to REGENTS at the address shown in Article 23 (Notices).
- 6.9 For the avoidance of doubt, if any patent or patent application, or any claim thereof, included within PATENT RIGHTS expires or is held invalid in a final decision by a court of competent jurisdiction and last resort and from which no appeal has been or can be taken, all obligation to pay royalties based on such patent, patent application or claim, or any claims patentably indistinct therefrom will cease as of the date of such expiration or final decision. LICENSEE will not, however, be relieved from paying any royalties that accrued before such expiration or decision or that are based on another valid patent or claim not expired or involved in such decision.
- 6.10 No royalties will be collected or paid hereunder on LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS distributed to or used by the United States Government. LICENSEE agrees to reduce the amount charged for LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS distributed to the United States Government by an amount equal to the royalty for such LICENSED PRODUCTS otherwise due REGENTS as provided herein.

7. DUE DILIGENCE

- 7.1 LICENSEE, upon execution of this Agreement, will diligently proceed with the development, manufacture, and SALE of LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS, and will diligently market them in quantities sufficient to meet the market demand.

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7.2 In addition to its obligations under Paragraph 7.1, LICENSEE will perform the following due diligence activities under this Agreement, through itself and/or its sublicensees:

- (a) [***] within [***] ([***) months after the Effective Date.
- (b) [***] within [***] ([***) months of [***].
- (c) [***] within [***] ([***) months after [***].
- (d) [***] within [***] ([***) months of [***].
- (e) [***] within [***] ([***) months after [***].

If LICENSEE has failed to meet any of its diligence obligations set forth in Paragraphs 7.1 and 7.2, through itself and/or its sublicensees, as applicable, then REGENTS will so notify LICENSEE in writing of its failure to perform.

7.3 LICENSEE will have the right and option to extend the target date of any such due diligence obligation (and each subsequent milestone due thereafter) for a period of [***] ([***) months upon the payment of [***] dollars (\$[***) within [***] ([***) days after the date to be extended, for each such extension option exercised by LICENSEE. LICENSEE may further extend the target date of any diligence obligation (and each subsequent milestone due thereafter) for an additional [***] ([***) months upon payment of an additional [***] dollars (\$[***)). These payments are in addition to the minimum royalty payments specified in Paragraph 6.5. Additional extensions may be granted only by mutual written agreement of the parties to this Agreement. In the event that Licensee is unable to meet the timeframes in Paragraph 7.2, as extended by this Paragraph 7.3, despite using diligent efforts to do so, taking into account delays which are due to factors (including technical or regulatory issues) which are outside of the reasonable control of LICENSEE, REGENTS and LICENSEE agree to discuss extending such timeframes and target dates in good faith; *provided, however*, that in no case is REGENTS bound to agree to cumulative extensions longer than [***] ([***) years unless REGENTS concludes in its sole discretion that such an extension is appropriate.

7.4 Should LICENSEE opt not to extend such timeframes or fail to use diligent efforts to meet a diligence obligation by the extended target date, then subject to Paragraph 7.6, REGENTS will have the right and option either to terminate this Agreement or to reduce LICENSEE's exclusive license to a non-exclusive royalty-bearing license. This right, if exercised by REGENTS, supersedes the rights granted in Article 3. The right to terminate this Agreement or reduce LICENSEE's exclusive license granted hereunder to a non-exclusive license will be REGENTS' sole remedy for breach of Paragraphs 7.1 or 7.2.

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- 7.5 At the request of either party, any controversy or claim arising out of or relating to the diligence provisions of Paragraphs 7.1 and 7.2 will be settled by arbitration conducted in San Francisco, California in accordance with the then current Commercial Arbitration Rules of the American Arbitration Association but such arbitration must be requested by a party within the sixty (60) day cure period set forth in Paragraph 7.6, except as otherwise provided in Paragraph 7.6 or unless the parties mutually agree later to arbitration hereunder. Judgment upon the award rendered by the arbitrator(s) will be binding on the parties and may be entered by either party in any court having jurisdiction. In determination of due diligence, the arbitrator may determine solely the issues of fact or law with respect to LICENSEE's rights under this Agreement but will not have the authority to award monetary damages or grant equitable relief.
- 7.6 To exercise either the right to terminate this Agreement or to reduce the license to a non-exclusive license for lack of diligence under Paragraphs 7.1 or 7.2, REGENTS will give LICENSEE written notice of the deficiency. LICENSEE thereafter has sixty (60) days to cure the deficiency or to request arbitration in accordance with Paragraph 7.5. If REGENTS has not received a written request for arbitration or satisfactory tangible evidence that the deficiency has been cured by the end of the sixty (60) day period, then REGENTS may, at its option, either terminate this Agreement or reduce LICENSEE's exclusive license to a non-exclusive license by giving further written notice to LICENSEE. These notices will be subject to Article 23 (Notices). Notwithstanding the foregoing, in the event that LICENSEE disputes in good faith whether the deficiency was timely cured, it may seek resolution of such dispute pursuant to Article 7.5, and in such event, no termination of this Agreement pursuant to this Article 7.6 may occur unless and until completion of such dispute resolution results in a determination that such deficiency has not been timely cured.

8. PROGRESS AND ROYALTY REPORTS

- 8.1 For each [***] period beginning July 1, 2014, LICENSEE will submit to REGENTS a [***] progress report covering LICENSEE's activities related to the development and testing of all LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS and the obtaining of necessary governmental approvals, if any, for marketing in the United States. These progress reports will be made for all development activities until the first SALE occurs in the United States.
- 8.2 Each progress report will be a sufficiently detailed summary of activities of LICENSEE and any sublicensees so that REGENTS may evaluate and determine LICENSEE's progress in development of LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS, and in meeting its diligence obligations under Article 7, and will include (but not be limited to) the following: summary of work completed and in progress; current schedule of anticipated events and milestones, including diligence milestones under Paragraph 7.2; anticipated market introduction dates for the LICENSED TERRITORY; and sublicensees' activities during the reporting period.

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- 8.3 LICENSEE also will report to REGENTS in its subsequent progress and royalty reports, the date of first SALE.
- 8.4 After the first SALE anywhere in the world, LICENSEE will make [***] royalty reports to REGENTS within [***] ([***)] days after [***]. Each such royalty report will include at least the following:
- (a) The number of LICENSED PRODUCTS manufactured and the number SOLD;
 - (b) Gross revenue from SALE of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS;
 - (c) NET SALES pursuant to Paragraph 2.6;
 - (d) Total royalties due REGENTS; and
 - (e) Names and addresses of any new sublicensees.
- 8.5 If no SALES have occurred during the reporting period, a statement to this effect is required in the royalty report for that period.
- 8.6 All reports under this Article 8 shall be treated as confidential information of LICENSEE.

9. BOOKS AND RECORDS

- 9.1 LICENSEE will keep full, true, and accurate books and records containing all particulars that are necessary for the purpose of showing the amount of royalties payable to REGENTS and LICENSEE's compliance with other obligations under this Agreement. Said books and records will be kept at LICENSEE's principal place of business or the principal place of business of the appropriate division of LICENSEE to which this Agreement relates. Said books and records and the supporting data will be open at all reasonable times during normal business hours upon reasonable notice, for [***] ([***)] years following the end of the calendar year to which they pertain, for the inspection and audit by a mutually acceptable independent auditor engaged by REGENTS for the purpose of verifying LICENSEE's royalty statement or compliance in other respects with this Agreement. Such auditor will be bound to hold all information in confidence except as necessary to communicate LICENSEE's non-compliance with this Agreement to REGENTS.
- 9.2 The fees and expenses of REGENTS' mutually acceptable independent auditor performing such an examination will be borne by REGENTS. However, if an error

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in underpaid royalties to REGENTS of more than [***] percent ([***]%) of the total royalties due for any year is discovered, then the fees and expenses of such auditor will be borne by LICENSEE.

10. LIFE OF THE AGREEMENT

- 10.1 Unless otherwise terminated by the operation of law or by acts of the parties in accordance with the terms of this Agreement, this Agreement will be in force from the Effective Date and will remain in effect until the expiration of the last VALID CLAIM under this Agreement.
- 10.2 Any termination of this Agreement shall not affect the rights and obligations set forth in the following articles or paragraphs:
- Article 2 Definitions
 - Article 4 Sublicenses (only as to Paragraphs 4.2 and 4.7)
 - Article 9 Books and Records
 - Article 10 Life of the Agreement (only as to Paragraphs 10.2 and 10.3)
 - Article 13 Disposition of Licensed Products Upon Termination
 - Article 16 Use of Names and Trademarks
 - Article 17 Limited Warranties
 - Article 19 Indemnification and Insurance
 - Article 23 Notices
 - Article 24 Late Payments (only as to outstanding payments)
 - Article 26 Confidentiality
 - Article 28 Severability
 - Article 29 Applicable Law; Venue; Attorney's Fees
- 10.3 Any termination of this Agreement will not relieve LICENSEE of its obligation to pay any monies due or owing at the time of such termination and will not relieve any obligations, of either party to the other party, established prior to termination.

11. TERMINATION BY REGENTS

- 11.1 Except for breach of diligence obligations, which is set forth in Article 7, if LICENSEE should violate or fail to perform any term of this Agreement, then

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REGENTS may give written notice of such default ("Notice of Default") to LICENSEE. If LICENSEE should fail to repair such default within sixty (60) days of the effective date of such notice, REGENTS will have the right to terminate this Agreement, and the licenses herein, by a second written notice ("Notice of Termination") to LICENSEE. If a Notice of Termination is sent to LICENSEE, this Agreement will automatically terminate on the effective date of such notice. Such termination will not relieve LICENSEE of its obligation to pay any royalty or license fees accrued at the time of such termination and will not impair any accrued rights of REGENTS. These notices will be subject to Article 23 (Notices).

12. TERMINATION BY LICENSEE

- 12.1 LICENSEE will have the right at any time to terminate this Agreement in whole or as to any portion of PATENT RIGHTS by giving notice in writing to REGENTS. Such notice of termination will be subject to Article 23 (Notices) and termination of this Agreement will be effective ninety (90) days after the effective date of such notice.
- 12.2 Any termination pursuant to Paragraph 12.1 will not relieve LICENSEE of any obligation or liability accrued hereunder prior to such termination or rescind anything done by LICENSEE or any payments made to REGENTS hereunder prior to the time such termination becomes effective, and such termination will not affect in any manner any rights of REGENTS arising under this Agreement prior to such termination.

13. DISPOSITION OF LICENSED PRODUCTS UPON TERMINATION

- 13.1 Upon termination of this Agreement by either party, for a period of [***] ([***)] days after the date of termination, LICENSEE may complete and SELL any partially made LICENSED PRODUCTS and continue to render any previously commenced LICENSED SERVICES, and continue the practice of LICENSED METHODS; provided, however, that all such SALES will be subject to the terms of this Agreement including, but not limited to, the payment of royalties at the rate and at the time provided herein and the rendering of reports thereon.

14. PATENT PROSECUTION AND MAINTENANCE

- 14.1 REGENTS will diligently prosecute and maintain the United States and foreign patent applications and patents under PATENT RIGHTS, subject to LICENSEE'S reimbursement of REGENTS' out of pocket costs under Article 14.3 below. All patent applications and patents under PATENT RIGHTS will be held in the name of REGENTS and IGT. REGENTS will have sole responsibility for retaining and instructing patent counsel, but continued use of such counsel at any point in the patent prosecution process, subsequent to the initial filing of a U.S. patent application covering the INVENTION, shall be subject to the approval of LICENSEE. If LICENSEE rejects [***] of REGENTS' choice of prosecution counsel, then REGENTS may select new prosecution counsel without

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LICENSEE's consent. REGENTS shall promptly provide LICENSEE with copies of all relevant documentation, including all responses at least [***] ([***)] days prior to the anticipated filing deadline to the extent such advance notice is available, so that LICENSEE may be currently informed and apprised of the continuing prosecution of PATENT RIGHTS. LICENSEE agrees to keep this documentation confidential in accordance with Article 26. LICENSEE may comment upon such documentation, and REGENTS will reasonably consider all such comments made by LICENSEE; provided, however, that if LICENSEE has not commented upon such documentation in reasonable time for REGENTS to sufficiently consider LICENSEE's comments prior to the deadline for filing a response with the relevant government patent office, REGENTS will be free to respond appropriately without consideration of LICENSEE's comments. LICENSEE and LICENSEE's patent counsel will have the right to consult with patent counsel chosen by REGENTS. REGENTS will file foreign counterparts of the REGENTS' PATENT RIGHTS in countries selected by LICENSEE, subject to Paragraph 14.4.

- 14.2 REGENTS will use reasonable efforts to prepare or amend any patent application to include claims reasonably requested by LICENSEE to protect the LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS contemplated to be SOLD or to be practiced under this Agreement. REGENTS will not abandon a patent application (unless filing a continuation or divisional filing or an equivalent thereof) or fail to maintain a patent without LICENSEE's prior written consent.
- 14.3 Subject to Paragraph 14.4, one half (1/2) of the past, unreimbursed costs for preparing, filing, prosecuting, and maintaining all United States and foreign patent applications and patents under PATENT RIGHTS will be paid by LICENSEE within [***] ([***)] days of the Effective Date of this Agreement. The remaining other one half (1/2) of the past, unreimbursed costs for preparing, filing, prosecuting, and maintaining all United States and foreign patent applications and patents under PATENT RIGHTS will be paid by LICENSEE within [***] ([***)] days of [***]. If, however, REGENTS grants additional exclusive license by [***], the second half installment of the past, unreimbursed patents costs will be not be due to REGENTS. To date, the remaining total past patent costs paid by REGENTS are about [***] U.S. Dollars (\$[***]). Subject to Paragraph 14.4, all future costs for preparing, filing, prosecuting, and maintaining all United States and foreign patent applications and patents under PATENT RIGHTS will be borne by LICENSEE. If, however, REGENTS grants additional exclusive license, the costs of preparing, filing, prosecuting and maintaining such patent applications and patents will be divided equally among the exclusive licensees from the effective date of such subsequently granted license agreement. In addition, if, REGENTS reduces the exclusive license granted herein to non-exclusive licenses pursuant to Paragraphs 7.3 7.4, 7.5 or 7.6, and REGENTS grants additional license(s), the costs of preparing, filing, prosecuting and maintaining such patent applications and patents will be divided equally among the licensed parties from the effective date of each subsequently granted license agreement. Payments are due within [***] ([***)] days after receipt of invoice from REGENTS.

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- 14.4 LICENSEE's obligation to underwrite and to pay all domestic and foreign patent filing, prosecution, and maintenance costs will continue for so long as this Agreement remains in effect; provided, however, that LICENSEE may terminate its obligations with respect to any given patent application or patent in any or all designated countries upon [***] ([***)] months' written notice to REGENTS. REGENTS will use its best efforts to curtail patent costs when such a notice is received from LICENSEE. REGENTS may continue prosecution and/or maintenance of such applications or patents at its sole discretion and expense; provided, however, that LICENSEE will have no further right or licenses thereunder.

15. MARKING

- 15.1 Prior to the issuance in the United States of patents under PATENT RIGHTS, LICENSEE agrees to mark LICENSED PRODUCT(S) (or their containers or labels) SOLD by it in the United States under the license granted in this Agreement with the words "Patent Pending," and following the issuance in the United States of one or more patents under PATENT RIGHTS, with the patent numbers of the PATENT RIGHTS. All LICENSED PRODUCTS SOLD in other countries will be marked in such manner as to conform with the patent laws and practice of such countries.

16. USE OF NAMES AND TRADEMARKS

- 16.1 Nothing contained in this Agreement will be construed as conferring any right to use in advertising, publicity or other promotional activities any name, trademark, trade name, or other designation of either party hereto by the other (including any contraction, abbreviation, or simulation of any of the foregoing). Unless required by law, regulation, or rules of a securities exchange, or consented to in writing by REGENTS, the use by LICENSEE of the name "The Regents of the University of California" or the name of any University of California campus in advertising, publicity or other promotional activities is expressly prohibited.

17. LIMITED WARRANTIES AND COVENANTS

- 17.1 REGENTS warrants to LICENSEE that (a) to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement, it has the lawful right to grant the licenses granted to LICENSEE pursuant to this Agreement, (b) to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement, it has not previously granted to any third party any rights that conflict with the licenses granted to LICENSEE pursuant to this Agreement, and (c) to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement and of REGENTS' patent prosecution counsel, no third party who is not designated in filings with relevant patent authorities as an inventor of the PATENT RIGHTS is, or has claimed or asserted in writing to REGENTS that it is, an inventor of the PATENT RIGHTS.

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- 17.2 Except as expressly provided in this Agreement, the licenses granted pursuant to this Agreement, the BIOLOGICAL MATERIAL, and the associated INVENTION are provided WITHOUT WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED. REGENTS MAKES NO REPRESENTATION OR WARRANTY THAT THE INVENTION, THE BIOLOGICAL MATERIAL, PATENT RIGHTS, LICENSED PRODUCTS, LICENSED SERVICES OR LICENSED METHODS WILL NOT INFRINGE ANY PATENT OR OTHER PROPRIETARY RIGHT.
- 17.3 EXCEPT FOR LICENSEE'S OBLIGATION TO INDEMNIFY AGAINST CLAIMS OF THIRD PARTIES UNDER ARTICLE 19 (INDEMNIFICATION AND INSURANCE), IN NO EVENT WILL EITHER PARTY BE LIABLE TO THE OTHER FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM EXERCISE OF THE LICENSES GRANTED PURSUANT TO THIS AGREEMENT OR THE USE OF THE INVENTION, THE BIOLOGICAL MATERIAL, PATENT RIGHTS, LICENSED METHODS, LICENSED SERVICES OR LICENSED PRODUCTS. THE REGENTS WILL NOT BE LIABLE FOR DIRECT DAMAGES TO THE OTHER PARTY CAUSED BY AN ASSIGNMENT BY THE REGENTS' INVENTORS OF THE PATENT RIGHTS TO A THIRD PARTY.
- 17.4 Nothing in this Agreement is or will be construed as:
- (a) A warranty or representation by REGENTS as to the validity, enforceability or scope of any PATENT RIGHTS; or
 - (b) A warranty or representation that anything made, used, or SOLD under any license granted in this Agreement is or will be free from infringement of patents of third parties; or
 - (c) An obligation to bring or prosecute actions or suits against third parties for patent infringement, except as provided in Article 18; or
 - (d) Conferring by implication, estoppel, or otherwise any license or rights under any patents of REGENTS or IGT other than PATENT RIGHTS as defined herein, regardless of whether such patents are dominant or subordinate to PATENT RIGHTS; or
 - (e) An obligation to furnish any know-how not provided in the patents and patent applications under PATENT RIGHTS and REGENTS' PROPERTY RIGHTS.

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- 17.5 REGENTS shall promptly notify LICENSEE in the event (to the extent of the actual knowledge of the licensing professional responsible for administration of this agreement) that IGT (a) files in any court or agency pursuant to any statute or regulation of any state or country, a petition in bankruptcy or insolvency, for reorganization, or for an arrangement or appointment of a receiver or trustee of IGT or of its assets; (b) is served with an involuntary petition against it, filed in any insolvency proceeding; (c) proposes or is a party to any dissolution or liquidation; or (d) makes an assignment for the benefit of its creditors. REGENTS shall promptly notify LICENSEE upon any termination of the IIA, or receipt of notice of termination thereof.

18. PATENT INFRINGEMENT

- 18.1 In the event that either party (and in the case of REGENTS, to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement) learns of the infringement of any PATENT RIGHTS under this Agreement, such party will promptly provide the other party with notice and reasonable evidence of such infringement (“Infringement Notice”). During the period and in a jurisdiction where LICENSEE has exclusive rights under this Agreement, neither party will notify a third party, including the infringer, of the infringement without first obtaining consent of the other party, which consent will not be unreasonably withheld; provided, however, that LICENSEE may notify any then-existing sublicensees under the relevant PATENT RIGHTS of such infringement without REGENTS’ prior consent if such sublicensee is bound by obligations of confidentiality with respect to such information. Both parties will use diligent efforts, in cooperation with each other, to terminate such infringement without litigation.

- 18.2 If the infringing activity of potential commercial significance has not been abated within [***] ([***)] days following the effective date of the Infringement Notice, LICENSEE may institute suit for patent infringement against the infringer. In accordance with the terms of the IIA, REGENTS and/or IGT may voluntarily join such suit at its own expense, but may not thereafter commence suit against the infringer for the acts of infringement that are the subject of LICENSEE’s suit or any judgment rendered in that suit. [***]. If, in a suit initiated by LICENSEE, REGENTS is involuntarily joined [***].

If, within [***] ([***)] days following the effective date of the Infringement Notice, the infringing activity of potential commercial significance has not been abated and LICENSEE has not brought suit against the infringer, REGENTS or IGT may institute suit for patent infringement against the infringer. If REGENTS or IGT institutes such suit, LICENSEE may not join such suit without REGENTS’ or IGT’s consent, as applicable, and may not thereafter commence suit against the infringer for the acts of infringement that are the subject of REGENTS’ or IGT’s suit or any judgment rendered in that suit.

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Notwithstanding the foregoing, the parties may by mutual agreement, at any time, bring and control such suit jointly against an infringer of the PATENT RIGHTS, sharing costs in such manner as they may then agree.

- 18.3 Such legal action as is decided upon will be at the expense of the party instituting the suit pursuant to Paragraph 18.2, and all recoveries recovered thereby will [***], provided that legal action brought jointly by REGENTS and/or IGT and LICENSEE, and participated in by each, will be [***] and all recoveries will be allocated in the following order: (a) to each party pro rata reimbursement of the attorney's costs, fees, and other related expenses to the extent each party paid for such costs, fees, and expenses, until all such costs, fees, and expenses are reimbursed to each party; and (b) [***].
- 18.4 Each party will cooperate with the other in litigation instituted hereunder but at the expense of the party instituting the suit pursuant to Paragraph 18.2. Such litigation will be controlled by the party instituting such suit, but the other party may be represented by counsel of its choice. In no event may either party admit liability or wrongdoing on behalf of the other party without the other party's prior written consent.
- 18.5 Any agreement made by LICENSEE for the purposes of settling litigation or other dispute shall comply with the requirements of Article 4 (Sublicenses) of this Agreement.

19. INDEMNIFICATION AND INSURANCE

- 19.1 LICENSEE will, and will require its sublicensees to, indemnify, hold harmless, and defend REGENTS and IGT and their officers, employees, and agents; sponsor(s) of the research that led to the INVENTION and BIOLOGICAL MATERIAL included in PROPERTY RIGHTS; and the inventors of any patents and patent applications under PATENT RIGHTS and their employers against any and all losses, damages, costs, fees, and expenses resulting from third party claims and suits arising out of exercise of this license or any sublicense or any use or possession of the BIOLOGICAL MATERIAL. This indemnification will include, but not be limited to, any product liability claims.
- 19.2 LICENSEE, at its sole cost and expense, will ensure that the applicable entity performing activities in connection with any work performed hereunder, whether LICENSEE, an AFFILIATE, or a sublicensee, will obtain, keep in force, and maintain the following insurance:
- (a) prior to the start of clinical trials of a LICENSED PRODUCT, Commercial Form General Liability Insurance (contractual liability included) with limits as follows:

Each Occurrence	\$[***]
Products/Completed Operations Aggregate	\$[***]
Personal and Advertising Injury	\$[***]
General Aggregate	\$[***]

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- (b) upon the start of any clinical trials of a LICENSED PRODUCT, Commercial Form General Liability Insurance (contractual liability included), and product liability insurance if not otherwise included, with limits as follows:

Each Occurrence	\$[***]
Products/Completed Operations Aggregate	\$[***]
Personal and Advertising Injury	\$[***]
General Aggregate	\$[***]

- (c) upon the first commercial sale of a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD, Commercial Form General Liability Insurance (contractual liability included), and product liability insurance if not otherwise included, with limits as follows:

Each Occurrence	\$[***]
Products/Completed Operations Aggregate	\$[***]
Personal and Advertising Injury	\$[***]
General Aggregate	\$[***]

If the above insurance is written on a claims-made form, it shall continue for [***] ([***)] years following termination or expiration of this Agreement.

- (d) worker's compensation as legally required in the jurisdiction in which LICENSEE, an AFFILIATE, or a sublicensee, as applicable, is doing business.

LICENSEE will promptly notify REGENTS of any material reduction in the insurance coverages below the amounts required hereunder.

- 19.3 The coverage and limits referred to in Paragraph 19.2 above will not in any way limit the liability of LICENSEE under Paragraph 19.1. Upon the execution of this Agreement, LICENSEE will furnish REGENTS with certificates of insurance evidencing compliance with all requirements. Such certificates will:

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- (a) where possible, provide for [***] ([***] days' ([***] ([***]) days for non-payment of premium) advance written notice to REGENTS of any cancellation of insurance coverages;
- (b) indicate that REGENTS has been endorsed as an additional insured under the coverage described above in Paragraph 19.2; and
- (c) include a provision that the coverage will be primary and will not participate with, nor will be excess over, any valid and collectable insurance or program of self-insurance maintained by REGENTS.

19.4 REGENTS will promptly notify LICENSEE in writing of any claim or suit brought against REGENTS for which REGENTS intends to invoke the provisions of Paragraph 19.1. LICENSEE will keep REGENTS informed of its defense of any claims pursuant to Paragraph 19.1, and REGENTS will cooperate reasonably in any such suit. If REGENTS invokes the provisions of Paragraph 19.1, REGENTS will not make any admissions or take any actions in such claim or suit that may prejudice or impair LICENSEE's ability to defend such claim or suit without LICENSEE's prior written consent, and LICENSEE will not admit liability or wrongdoing on behalf of REGENTS without REGENTS' prior written consent.

20. COMPLIANCE WITH LAWS

20.1 LICENSEE will comply with all applicable international, national, state, regional, and local laws and regulations in performing its obligations hereunder and in its use, manufacture, SALE or import of the LICENSED PRODUCTS, LICENSED SERVICES, or practice of the LICENSED METHODS. LICENSEE understands that REGENTS is subject to United States laws and regulations (including the Arms Export Control Act, as amended, and the Export Administration Act of 1979), controlling the export of technical data, computer software, laboratory prototypes and other commodities, and REGENTS' obligations under this Agreement are contingent on compliance with such laws and regulations. The transfer of certain technical data and commodities may require a license from the cognizant agency of the United States Government and/or written assurances by LICENSEE that LICENSEE will not export such technical data and/or commodities to certain foreign countries without prior approval of such agency. REGENTS neither represents that a license will not be required nor that, if required, it will be issued.

21. GOVERNMENT APPROVAL OR REGISTRATION

21.1 If this Agreement or any associated transaction is required by the law of any nation to be either approved or registered with any governmental agency, LICENSEE will assume all legal obligations to do so. LICENSEE will notify REGENTS if it becomes aware that this Agreement is subject to a United States or foreign government reporting or approval requirement. LICENSEE will make all necessary filings and pay all costs including fees, penalties, and all other out-of-pocket costs associated with such reporting or approval process.

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22. ASSIGNMENT

- 22.1 This Agreement is binding upon and shall inure to the benefit of REGENTS, and its successors and assigns. This Agreement will be personal to LICENSEE and assignable by LICENSEE only with the written consent of REGENTS, except that LICENSEE may freely assign this Agreement to its AFFILIATE or to an acquirer of all or substantially all of LICENSEE's stock, assets or business to which this Agreement relates. If LICENSEE assigns this Agreement to a non-AFFILIATE third party, then upon execution of the assignment agreement, LICENSEE will (i) provide REGENTS with the updated contact information, and (ii) [***].

23. NOTICES

- 23.1 All notices under this Agreement will be deemed to have been fully given and effective when done in writing and delivered in person, or three (3) business days after mailed by registered or certified U.S. mail, or one (1) business day after deposited with an express carrier service requiring signature by recipient, and addressed as follows:

To REGENTS: Office of Technology Licensing
2150 Shattuck Avenue, Suite 510
Berkeley, CA 94704-1347
Attn.: Director (UC Case No.: B03-104)

To LICENSEE: 4D Molecular Therapeutics LLC
444 Laverne Avenue
Mill Valley, CA 94941
Attn.: [***]

Either party may change its address upon written notice to the other party.

24. LATE PAYMENTS

- 24.1 If monies owed to REGENTS under this Agreement are not received by REGENTS when due, LICENSEE will pay to REGENTS interest charges at a rate of [***] percent ([***]%) per annum, or less if required by applicable law. Such interest will be calculated from the date payment was due until actually received by REGENTS. Such accrual of interest will be in addition to, and not in lieu of, enforcement of any other rights of REGENTS related to such late payment. Acceptance of any late payment will not constitute a waiver under Article 25 (Waiver) of this Agreement.

25. WAIVER

- 25.1 The failure of either party to assert a right hereunder or to insist upon compliance with any term or condition of this Agreement will not constitute a waiver of that right or excuse a similar subsequent failure to perform any such term or condition

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by the other party. None of the terms and conditions of this Agreement can be waived except by the written consent of the party waiving compliance.

26. CONFIDENTIALITY

- 26.1 Each party will hold the other party's proprietary business and technical information, patent prosecution material and other proprietary information, including the negotiated terms of this Agreement, in confidence and against disclosure to third parties (except to those employees or authorized representatives having a need to know such information and who are bound by confidentiality obligations with respect thereto) with at least the same degree of care as it exercises to protect its own data and license agreements of a similar nature. Each party will only use such information of the other party in accordance with the terms of this Agreement. These obligations will expire [***] ([***)] years after the termination or expiration of this Agreement.
- 26.2 Nothing contained herein will in any way restrict or impair the right of LICENSEE or REGENTS to use, disclose, or otherwise deal with any information or data which:
- (a) at the time of disclosure to the receiving party is generally available to the public or thereafter becomes generally available to the public by publication or otherwise, through no act or omission of the receiving party;
 - (b) the receiving party can show by its contemporaneous written records was in its possession, without confidentiality restrictions, prior to the time of disclosure to it hereunder, and was not acquired directly or indirectly from the disclosing party;
 - (c) is independently made available to the receiving party, without confidentiality restrictions, as a matter of right by a third party under no obligation of confidentiality to the disclosing party;
 - (d) is independently developed by the receiving party without any use of the information disclosed, as shown by the receiving party's contemporaneous written records; or
 - (e) is subject to disclosure under the California Public Records Act, court order, or other requirements of law, regulation, or rules of a securities exchange, provided that the receiving party promptly informs the disclosing party of such request.
- 26.3 Notwithstanding anything to the contrary in Paragraph 26.1, LICENSEE may disclose proprietary information it receives pursuant to this Agreement, and the terms of this Agreement, to its actual or potential investors, acquirers, and sublicensees who are bound by obligations of confidentiality with respect thereto. Moreover, REGENTS has the right to share such information with IGT under the

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confidentiality terms in the IIA. REGENTS will be free to release to IGT, the inventors, and senior administrators employed by REGENTS the terms and conditions of this Agreement upon their request. If such request is made, REGENTS will inform such employees of the confidentiality obligations set forth above and will request that they do not disclose such terms and conditions to others. Should a third party inquire whether a license to PATENT RIGHTS is available, REGENTS may disclose the existence of this Agreement and the extent of the grant in Articles 3 and 4 to such third party, but will not disclose the name of LICENSEE unless LICENSEE has already made such disclosure publicly, except where REGENTS is required to release information under either the California Public Records Act or other applicable law, provided REGENTS gives prior written notice to LICENSEE of such disclosure.

- 26.4 LICENSEE and REGENTS agree to destroy or return to the disclosing party proprietary information received from the other in its possession within [***] ([***)] days following the effective date of termination of this Agreement. However, each party may retain one copy of proprietary information of the other solely for archival purposes in non-working files for the sole purpose of verifying the ownership of the proprietary information, provided such proprietary information will be subject to the confidentiality provisions set forth in this Article 26. LICENSEE and REGENTS agree to provide each other, within [***] ([***)] days following termination of this Agreement, with a written notice that such proprietary information has been returned or destroyed.

27. FORCE MAJEURE

- 27.1 Except for LICENSEE's obligation to make any payments to REGENTS hereunder, the parties to this Agreement shall be excused from any performance required hereunder if such performance is rendered impossible or unfeasible due to any catastrophes or other major events beyond their reasonable control, including, without limitation, war, riot, and insurrection; laws, proclamations, edicts, ordinances, or regulations; strikes, lockouts, or other serious labor disputes; and floods, fires, explosions, or other natural disasters. When such events have abated, the parties' respective obligations hereunder will resume.

28. SEVERABILITY

- 28.1 The provisions of this Agreement are severable, and in the event that any provision of this Agreement will be determined to be invalid or unenforceable under any controlling body of law, such invalidity or enforceability will not in any way affect the validity or enforceability of the remaining provisions hereof.

29. APPLICABLE LAW; VENUE; ATTORNEYS' FEES

- 29.1 THIS AGREEMENT WILL BE CONSTRUED, INTERPRETED, AND APPLIED IN ACCORDANCE WITH THE LAWS OF THE STATE OF CALIFORNIA, excluding any choice of law rules that would direct the application of the laws of

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another jurisdiction, but the scope and validity of any patent or patent application under PATENT RIGHTS will be determined by the applicable law of the country of such patent or patent application. Any legal action brought by the parties relating to this Agreement will be conducted in San Francisco, California. The prevailing party in any legal action under this Agreement will be entitled to recover its reasonable attorneys' fees in addition to its costs and necessary disbursements.

30. ELECTRONIC COPY; COUNTERPARTS

- 30.1 The parties to this document agree that a copy of the original signature to this Agreement (including an electronic copy) may be used for any and all purposes for which the original signature may have been used. The parties further waive any right to challenge the admissibility or authenticity of this document in a court of law based solely on the absence of an original signature.
- 30.2 This Agreement may be executed in two or more counterparts, including by facsimile or electronic exchange of signed copies in PDF format, each of which shall be deemed an original document, and all of which, together with this writing, shall be deemed one instrument.

31. SCOPE OF AGREEMENT; AMENDMENT; WAIVER

- 31.1 This Agreement, together with the OTHER LICENSE AGREEMENT and the MTA, incorporates the entire agreement between the parties with respect to the subject matter hereof, and supersedes all prior agreements, discussions and writings in respect thereof, including without limitation the Letter Agreement dated May 8, 2013.
- 31.2 This Agreement may be altered or modified only by written amendment duly executed by the parties hereto. A waiver of any breach or default of this Agreement shall not constitute a waiver of any other right hereunder or any subsequent breach or default.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in duplicate originals by their duly authorized officers or representatives.

THE REGENTS OF THE UNIVERSITY, OF CALIFORNIA

4D MOLECULAR THERAPEUTICS LLC

By /s/ Carol Mimura
Carol Mimura, Ph.D.
Assistant Vice Chancellor
Office of Technology Licensing

By /s/ David H. Kim

Printed Name David H. Kim

Title Co-Founder, Executive Chair

Date Dec. 19, 2013

Date December 19, 2013

***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

Exhibit A

Omitted pursuant to Regulation S-K, Item 601(a)(5).

Agreement Control No. 2014-16-0090

UNIVERSITY OF CALIFORNIA, BERKELEY

OFFICE OF TECHNOLOGY LICENSING



EXCLUSIVE LICENSE AND BAILMENT AGREEMENT

BETWEEN

4D MOLECULAR THERAPEUTICS, LLC

AND

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

FOR

**ADENO-ASSOCIATED VIRUS VARIANTS FOR ENHANCED GENE DELIVERY
IN THE PRESENCE OF NEUTRALIZING ANTIBODIES**

UC Case No.: B13-135

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UNIVERSITY OF CALIFORNIA, BERKELEY

OFFICE OF TECHNOLOGY LICENSING



**EXCLUSIVE LICENSE AND BAILMENT AGREEMENT
FOR
ADENO-ASSOCIATED VIRUS VARIANTS FOR ENHANCED GENE DELIVERY
IN THE PRESENCE OF NEUTRALIZING ANTIBODIES**

UC Case No.: B13-135

This exclusive license agreement (“Agreement”) is effective December 19, 2013 (“Effective Date”), by and between **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA**, a California corporation, whose legal address is 1111 Franklin Street, 12th Floor, Oakland, California 94607-5200, acting through its Office of Technology Licensing, at the University of California, Berkeley, 2150 Shattuck Avenue, Suite 510, Berkeley, CA 94704-1347 (“REGENTS”) and **4D MOLECULAR THERAPEUTICS LLC**, a Delaware limited liability company having a principal place of business at 19 Rima Court, Danville, CA 94526 (“LICENSEE”). The parties agree as follows:

1. BACKGROUND

- 1.1 REGENTS has an assignment of “[***]” invented by [***], employed by the University of California, Berkeley (the “INVENTION”), as described in REGENTS’ Case No. B13-135, and to the patents and patent applications under REGENTS’ PATENT RIGHTS (as defined below), which are directed to the INVENTION.
- 1.2 LICENSEE entered into a letter agreement with REGENTS effective May 6, 2013, terminating on November 6, 2013, for the purpose of evaluating the INVENTION and granting LICENSEE an exclusive right to negotiate an option or exclusive license in REGENTS’ PATENT RIGHTS to the INVENTION, which letter agreement covers LICENSEE’s commitment to reimburse REGENTS’ patent costs during the period of good faith negotiation for an exclusive option or license.
- 1.3 LICENSEE has provided REGENTS with a commercialization plan for the INVENTION and business strategy in order to evaluate its capabilities as a LICENSEE.
- 1.4 The development of the INVENTION was sponsored in part by various grants by U.S. Government agencies, and as a consequence, REGENTS elected to retain title to the INVENTION subject to the rights of the U.S. Government under 35 USC 200-212 and implementing regulations, including that REGENTS, in turn, has granted back to the U.S. Government a non-exclusive, non-transferable,

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irrevocable, paid-up license to practice or have practiced the INVENTION for or on behalf of the U.S. Government throughout the world. These U.S. Government grants are National Institutes of Health Contract No. HL081527.

- 1.5 REGENTS and LICENSEE wish to have the INVENTION perfected and marketed as soon as reasonably practicable so that products resulting therefrom may be available for public use and benefit.
- 1.6 LICENSEE wishes to acquire, and REGENTS wishes to grant to LICENSEE, an exclusive license under the REGENTS' PATENT RIGHTS and an exclusive bailment of the BIOLOGICAL MATERIAL included in the REGENTS' PROPERTY RIGHTS for the purpose of undertaking development and to make, have made, use, sell, offer for sale, import, and export LICENSED PRODUCTS as defined below.
- 1.7 REGENTS and LICENSEE are simultaneously entering into a license agreement covering the inventions under REGENTS' Case No. B03-104 (the "OTHER LICENSE AGREEMENT").

2. DEFINITIONS

- 2.1 "REGENTS' PATENT RIGHTS" means REGENTS' rights in [***] and assigned to REGENTS; continuing applications thereof, including divisionals, substitutions, extensions and continuation-in-part applications (only to the extent, however, that claims in the continuation-in-part applications are entitled to the priority filing date of the parent patent application); any patents issuing on said application or continuing applications, including all reexaminations, reissues, and extensions thereof; and any corresponding foreign patents or applications.
- 2.2 "LICENSED PRODUCTS" means all kits, compositions of matter, articles of manufacture, materials, and products, the manufacture, use, SALE, offer for SALE, or import of which: (a) would require the performance of the LICENSED METHOD; or (b) but for the license granted pursuant to this Agreement, would infringe, or contribute to or induce the infringement of, a VALID CLAIM of any issued, unexpired patent under REGENTS' PATENT RIGHTS or a VALID CLAIM being prosecuted in a pending patent application under REGENTS' PATENT RIGHTS.
- 2.3 "LICENSED METHOD" means any process or method, the use or practice of which, but for the license pursuant to this Agreement, would infringe, or contribute to or induce the infringement of, a VALID CLAIM of any issued patent or pending patent application under REGENTS' PATENT RIGHTS in that country in which the LICENSED METHOD is used or practiced.
- 2.4 "VALID CLAIM" means (i) a claim in an issued and unexpired patent included in the REGENTS' PATENT RIGHTS that has not been disclaimed, abandoned or withdrawn and has not been held unenforceable or invalid by a final judgment of a

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court or other governmental agency of competent jurisdiction from which no appeal can be or is taken, and has not been admitted to be invalid or unenforceable through reissue or disclaimer or otherwise, or (ii) a claim in a pending patent application included within the REGENTS' PATENT RIGHTS that has been filed in good faith and has not been abandoned or finally disallowed without the possibility of appeal or refiling, which application has not been pending for more than [***] ([***)] years after its priority date, provided that for clarity, any claim of a pending patent application that is pending for more than [***] ([***)] years after its priority date shall be eligible to become a VALID CLAIM if it later issues and otherwise falls within subsection (i).

2.5 "LICENSED FIELD OF USE" means all fields of use.

2.6 "NET SALES" means the gross invoice price charged by, and the fair market value of non-cash consideration paid to, LICENSEE for SALES of LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS, less the sum of the following actual and customary deductions where applicable: (i) the actual amount of write-offs for bad debts (in accordance with generally accepted accounting principles and that would reasonably be taken by a similarly situated company) related to such SALES; (ii) cash, prompt pay, trade or quantity discounts; (iii) sales tax, use tax, consumption tax, Deductible Value Added Tax, tariffs, import/export duties or other excise taxes when included in gross sales, but not income taxes derived from such sales; (iv) transportation charges; and (v) allowances or credits to customers because of rejections or returns. For purposes of calculating NET SALES, NET SALES shall not include any SALE of LICENSED PRODUCTS, LICENSED SERVICES, or LICENSED METHODS used for development purposes (including, without limitation for clinical studies) or provided as samples or free goods (including, without limitation, product transferred in connection with patient assistance programs or other charitable purposes); and a SALE to a sublicensee that is not intended for end use shall not be included in NET SALES. "Deductible Value Added Tax" is value added tax to the extent that is not subject to a tax credit, refund or deduction by a taxing authority.

In the event that LICENSED PRODUCTS, LICENSED SERVICES or LICENSED METHODS are COMBINATION PRODUCTS, the NET SALES of such COMBINATION PRODUCT, for the purposes of determining royalty payments pursuant to this Agreement, shall be determined by multiplying the NET SALES of the COMBINATION PRODUCT (as defined below) during the applicable royalty reporting period, by the fraction $A/(A+B)$, where A is the fair market value of the LICENSED PRODUCTS, LICENSED SERVICES or LICENSED METHODS, and B is the fair market value of all OTHER COMPONENTS included in the COMBINATION PRODUCT. If a COMBINATION PRODUCT is sold, whether or not the OTHER COMPONENTS are also sold separately, LICENSEE shall make a good faith determination of the respective fair market values of the LICENSED PRODUCT, LICENSED SERVICES or LICENSED METHODS and all OTHER COMPONENTS included in the COMBINATION

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PRODUCT, and shall notify REGENTS of such determination and provide REGENTS with data to support such determination.

- 2.7 “COMBINATION PRODUCT” means a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD that incorporates at least one OTHER COMPONENT. For clarity, all references to “LICENSED PRODUCTS, LICENSED SERVICES or LICENSED METHODS” in this Agreement shall be deemed to include COMBINATION PRODUCTS.
- 2.8 “OTHER COMPONENT” means a proprietary active therapeutic ingredient or a delivery device, in each case that is not itself a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD.
- 2.9 “AFFILIATE” of LICENSEE means any entity that, directly or indirectly, Controls LICENSEE, is Controlled by LICENSEE, or is under common Control with LICENSEE. “Control” means (i) having the actual, present capacity to elect a majority of the directors of such affiliate, (ii) having the power to direct at least fifty percent (50%) of the voting rights entitled to elect directors, or (iii) in any country where the local law will not permit foreign equity participation of a majority, ownership or control, directly or indirectly, of the maximum percentage of such outstanding stock or voting rights permitted by local law.
- 2.10 “LICENSED TERRITORY” means United States of America, its territories and possessions, and subject to Paragraph 14.4, any foreign countries where REGENTS’ PATENT RIGHTS exist.
- 2.11 “SALE” means, for LICENSED PRODUCTS and LICENSED SERVICES, the act of selling, leasing or otherwise transferring, providing, or furnishing such product or service, and for LICENSED METHODS, the act of performing such method for any consideration. Correspondingly, “SELL” means to make or cause to be made a SALE, and “SOLD” means to have made or caused to be made a SALE.
- 2.12 “LICENSED SERVICE” means a service provided using LICENSED PRODUCTS or LICENSED METHODS.
- 2.13 “NON-ROYALTY SUBLICENSURE REVENUE” means any cash consideration, and subject to Paragraph 4.3(b), the cash equivalent of all other consideration, received by LICENSEE under each sublicense for the grant of rights under the REGENTS’ PATENT RIGHTS, but excluding: (a) any royalty payments on sales of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS by a sublicensee (which shall be included as EARNED ROYALTY SUBLICENSURE REVENUE); (b) any amounts paid by a sublicensee as bona fide reimbursement for research and development costs at fair market value for materials and full time equivalents; (c) bona fide loans or any payments in consideration for a grant of equity of the LICENSEE at fair market value; (d) amounts paid for supplies of product or other tangible materials; (e) amounts paid as reimbursement for expenses directly related to the pursuit, maintenance, and/or

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defense of REGENTS' PATENT RIGHTS; (f) milestone payments by a sublicensee for a product, service, or method that is not a LICENSED PRODUCT, LICENSED SERVICE, or LICENSED METHOD; (g) payments by a sublicensee for use of the BIOLOGICAL MATERIALS to identify or optimize products, services, or methods that are not LICENSED PRODUCTS, LICENSED SERVICES, or LICENSED METHODS; (h) withholding taxes and any other amounts by a sublicensee from amounts otherwise payable to LICENSEE under such sublicense agreement other than past due payments; and (i) payments for the supply of LICENSED PRODUCTS or materials used in the performance of LICENSED SERVICES or LICENSED METHODS. Without limiting the foregoing, the parties agree that NON-ROYALTY SUBLICENSE REVENUE shall not include consideration received by LICENSEE from a sublicensee that is not received in consideration for the grant of rights under the REGENTS' PATENT RIGHTS to make, use, offer for SALE, import, and SELL LICENSED PRODUCTS and LICENSED SERVICES, and to practice LICENSED METHODS.

- 2.14 "EARNED ROYALTY SUBLICENSE REVENUE" means any royalty payments received by LICENSEE pursuant to an agreement between LICENSEE and a sublicensee pursuant to which such sublicensee receives a sublicense under the PATENT RIGHTS, on SALES of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS by such sublicensee (which sales shall not be included as NET SALES).
- 2.15 "FIRST QUALIFIED ROUND" occurs on the first date on which the LICENSEE has received, in aggregate in excess of [***] US Dollars (\$[***]) from any one of or combination of equity financing, convertible debt financing, unrestricted grants, or the acquisition of all or substantially all of LICENSEE's limited liability company interests, assets or business; *provided, however*, that [***].
- 2.16 "FOUNDERS" means [***] and [***].
- 2.17 "PHASE I CLINICAL TRIAL" means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(a).
- 2.18 "PHASE IIB CLINICAL TRIAL" means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(b) and that is designed to support and immediately precede the initiation of a Phase III Clinical Trial without any further phase II trials by evaluating the dose-dependent effectiveness of a pharmaceutical product for a particular indication or indications in patients with the disease or condition under study and to determine the common side effects and risks associated with the pharmaceutical product.
- 2.19 "PHASE III CLINICAL TRIAL" means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(c).

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- 2.20 “REGENTS’ PROPERTY RIGHTS” means all of REGENTS’ personal property rights in the tangible property in the INVENTION licensed hereunder and to the BIOLOGICAL MATERIALS. REGENTS’ PROPERTY RIGHTS do not include REGENTS’ PATENT RIGHTS.
- 2.21 “BIOLOGICAL MATERIALS” shall have the meaning set forth in Article 1 of the Letter Agreement between REGENTS and LICENSEE, dated as of even date herewith (the “MTA”).

3. GRANT

- 3.1 (a) Subject to the limitations set forth in this Agreement, including the license granted to the U.S. Government and the rights reserved in Paragraph 3.3, REGENTS hereby grants and LICENSEE hereby accepts an exclusive license under REGENTS’ PATENT RIGHTS to make, use, offer for SALE, import, and SELL LICENSED PRODUCTS and LICENSED SERVICES, and to practice LICENSED METHODS, in the LICENSED FIELD OF USE in the LICENSED TERRITORY.
- (b) Subject to the limitations set forth in this Agreement and subject to the license granted to the U.S. Government, REGENTS hereby grants and LICENSEE hereby accepts an exclusive bailment and license under REGENTS’ PROPERTY RIGHTS to possess, make and use the BIOLOGICAL MATERIAL. LICENSEE acknowledges that the REGENTS is and will remain the sole owner of the BIOLOGICAL MATERIAL and the title of the material is not transferred to LICENSEE under this Agreement.
- (c) REGENTS have provided the LICENSEE with BIOLOGICAL MATERIAL in quantities as set forth in the MTA. No additional obligation is required of REGENTS’ with respect to bailment of the BIOLOGICAL MATERIAL.
- 3.2 The licenses under Paragraph 3.1 will be exclusive for a term commencing on the Effective Date and ending on the date of the last-to-expire VALID CLAIM under REGENTS’ PATENT RIGHTS.
- 3.3 Nothing in this Agreement will be deemed to limit the right of REGENTS to publish any and all technical data resulting from any research performed by REGENTS relating to the INVENTION and the BIOLOGICAL MATERIAL REGENTS expressly reserves the right to use the INVENTION, the BIOLOGICAL MATERIAL and related technology for its educational and research purposes; to disseminate the BIOLOGICAL MATERIAL and other tangible materials associated with, or required to practice the INVENTION and/or the REGENTS’ PATENT RIGHTS to researchers at nonprofit institutions for their educational and research purposes and to permit other nonprofit institutions to use such BIOLOGICAL MATERIAL to practice the REGENTS’ PATENT RIGHTS for education and research purposes.

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- 3.4 This Agreement will terminate immediately if LICENSEE files a claim asserting that any portion of the REGENTS' PATENT RIGHTS is invalid or unenforceable where the filing is by the LICENSEE, a third party on behalf of the LICENSEE, or a third party at the written urging of the LICENSEE.
- 3.5 LICENSEE will have a continuing responsibility to keep REGENTS informed of the large/small entity status, as defined in 15 U.S.C. 632, of itself and its sublicensees.
- 3.6 The INVENTION was funded in part by the U.S. Government. In accordance with 35 U.S.C. 204, to the extent required by law or regulation, any products covered by patent applications or patents claiming the INVENTION and sold in the United States will be substantially manufactured in the United States.

4. SUBLICENSES

- 4.1 REGENTS also grants to LICENSEE the right to sublicense to AFFILIATES and third parties the right to make, use, offer for SALE, import, and SELL LICENSED PRODUCTS and LICENSED SERVICES, and to practice LICENSED METHODS, provided that LICENSEE has exclusive rights under this Agreement at the time of sublicensing. LICENSEE will notify REGENTS of each sublicense granted hereunder and furnish to REGENTS a copy of each such sublicense agreement, which shall be treated as confidential information of LICENSEE. Every such sublicense will include:
 - (a) a statement setting forth the term after which LICENSEE's exclusive rights, privileges, and license hereunder will expire;
 - (b) as applicable, all the rights of, and require the performance of all the obligations due to, REGENTS (and, if applicable, the United States Government) under this Agreement, other than those rights and obligations specified in Article 5 (License Issue Fee) and Article 6 (Royalties), for which LICENSEE shall remain responsible; and
 - (c) the same provision for indemnification of REGENTS as has been provided for in this Agreement.
- 4.2 To the extent permitted under the sublicense agreement, a sublicensee shall have the right to grant further sublicenses to its AFFILIATE and third parties to the extent such sublicensee deems such further sublicense to be commercially reasonable, useful or necessary for the development and/or commercialization of LICENSED PRODUCT(S) or LICENSED METHOD(S) in accordance with this Agreement; provided that (i) such further sublicense is subject to a written sublicense agreement and is bound by all of the applicable terms, conditions,

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obligations, restrictions and other covenants of this Agreement that protect or benefit the REGENTS' (and, if applicable, the U.S. Government's) rights and interests under this Agreement, and (ii) the sublicensee shall, within [***] ([***)] days after issuing any further sublicense, furnish to LICENSEE for delivery to REGENTS, subject to any confidentiality provisions with third parties, all material terms of any such sublicenses, pertaining to the REGENTS' interests, including the sublicensee's name and address, and indemnification of REGENTS as provided in this Agreement.

- 4.3 LICENSEE will pay to REGENTS (i) [***] percent ([***)%] of NON-ROYALTY SUBLICENSE REVENUE and (ii) [***] percent ([***)%] of EARNED ROYALTY SUBLICENSE REVENUE, provided that in no event will the EARNED ROYALTY SUBLICENSE REVENUE due to REGENTS on sales of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS by a sublicensee be less than [***] percent ([***)%] of net sales of such sublicensee (which for purposes of this Paragraph 4.3 shall be calculated as though such sublicensee were LICENSEE under Paragraph 2.6.
- (a) In the event LICENSEE sublicenses the REGENTS' PATENT RIGHTS along with its own patent rights or those of other third parties, LICENSEE may reasonably determine in good faith the percentage of compensation received under such sublicense that represents consideration due for the grant of the rights under the REGENTS' PATENT RIGHTS, which percentage will be based upon the value of the REGENTS' PATENT RIGHTS licensed to the sublicensee relative to the value of LICENSEE's own patent rights or the other third party patent rights licensed to the sublicensee. When making payment under this Paragraph 4.3(a), LICENSEE shall provide REGENTS with all supporting information and documentation used to determine any such percentage (or shall reference previously provided supporting information and documentation). Notwithstanding the foregoing, in no case will LICENSEE be permitted to reduce the compensation to REGENTS under this Paragraph 4.3(a) in connection with LICENSEE's own patent rights or those of third parties by more than [***] percent ([***)%].
 - (b) If the consideration received is equity and approval to accept equity is granted by REGENTS, then the LICENSEE will transfer [***] percent ([***)%] of the equity LICENSEE receives to REGENTS or REGENTS' nominee. REGENTS will promptly notify the LICENSEE upon REGENTS' Office of the President's approval for the equity. If equity is not accepted, then the LICENSEE will pay REGENTS' portion in cash once the equity is liquidated.
 - (c) LICENSEE shall not be required to pay REGENTS more than [***] percent ([***)%] of NON-ROYALTY SUBLICENSE REVENUE and [***] percent ([***)%] of EARNED ROYALTY SUBLICENSE REVENUE even if LICENSEE sublicenses the REGENTS' PATENT RIGHTS under

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this Agreement and the patent rights under the OTHER LICENSE AGREEMENT. All amounts paid under this Paragraph 4.3 shall be credited against amounts due for the same LICENSED PRODUCT, LICENSED METHOD or LICENSED SERVICE under Paragraph 4.3 of the OTHER LICENSE AGREEMENT.

- 4.4 AFFILIATES will have no licenses under REGENTS' PATENT RIGHTS except as granted by sublicense pursuant to this Agreement.
- 4.5 For the purposes of this Agreement, the activities of all sublicensees pursuant to any sublicense shall be deemed to be the activities of LICENSEE, for which LICENSEE shall be responsible.
- 4.6 LICENSEE will collect payment of all monies and other consideration due REGENTS from sublicensees, and deliver all reports due REGENTS and received from sublicensees.
- 4.7 Upon termination of this Agreement for any reason, all sublicenses that are granted by LICENSEE pursuant to this Agreement, where the sublicensee is in compliance with its sublicense agreement as of the date of such termination, will remain in effect and will be assigned to REGENTS, except that REGENTS will not be bound to perform any duties or obligations set forth in any sublicenses that extend beyond the duties and obligations of REGENTS set forth in this Agreement.
- 4.8 If REGENTS (to the extent of the actual knowledge of the licensing professional responsible for administration of this case) discovers, or a third party discovers and notifies that licensing professional, that the INVENTION is [***] for an application covered by the LICENSED FIELD OF USE, but for which LICENSED PRODUCTS have not been developed or are not currently under development by LICENSEE, then REGENTS, as represented by the Office of Technology Licensing, shall give written notice to LICENSEE, except for: (1) information that is subject to restrictions of confidentiality with third parties, and (2) information which originates with REGENTS' personnel who do not assent to its disclosure to LICENSEE. REGENTS shall endeavor to provide to LICENSEE, at a minimum, a description of the nature and scope of the proposed sublicense sufficient for LICENSEE to evaluate its desire to develop and commercialize products for the relevant application as provided in this Paragraph 4.8.

LICENSEE shall have [***] ([***)] days to give REGENTS written notice stating whether LICENSEE elects to develop LICENSED PRODUCTS for such application.

If LICENSEE elects to develop and commercialize the proposed LICENSED PRODUCTS for such application, LICENSEE shall submit progress reports with respect thereto to REGENTS pursuant to Article 8.

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If LICENSEE elects not to develop and commercialize the proposed LICENSED PRODUCTS for such application, REGENTS may seek a third party(ies) to develop and commercialize the proposed LICENSED PRODUCTS for such application. If REGENTS is successful in finding a third party, it shall refer such third party to LICENSEE. If the third party requests a sublicense under this Agreement for such application, then LICENSEE shall report the request to REGENTS within [***] ([***)] days from the date of such written request. If the request results in a sublicense, then LICENSEE shall notify REGENTS pursuant to Paragraph 4.1.

If LICENSEE refuses to grant a sublicense to such third party, then within [***] ([***)] days after such refusal, LICENSEE shall submit to REGENTS a report specifying the license terms proposed by the third party and a written justification for LICENSEE's refusal to grant the proposed sublicense. If REGENTS, [***], determines that [***], then REGENTS shall [***], provided that [***].

5. LICENSE ISSUE FEE

5.1 LICENSEE will pay to REGENTS a non-creditable, non-refundable license issue fee as follows:

- (a) Five Thousand U.S. Dollars (\$5,000) within [***] ([***)] days following the Effective Date of this Agreement;
- (b) If approval to accept equity in LICENSEE is granted by REGENTS in accordance with this Agreement, then within [***] ([***)] days following the date on which the ACCEPTANCE NOTICE (as defined below) is received by the LICENSEE, LICENSEE shall issue to REGENTS' nominee (under the terms of a mutually agreed upon unit purchase agreement to be executed by the parties), an interest in LICENSEE (a "MEMBERSHIP INTEREST") which shall be non-voting, with an allocation percentage with respect to profits and losses equal to three percent (3%) as of close of the FIRST QUALIFIED ROUND; if all or a portion of the FIRST QUALIFIED ROUND involves convertible securities which will not convert into MEMBERSHIP INTERESTS until a subsequent financing event, then at the time of the conversion of those securities into MEMBERSHIP INTERESTS, the LICENSEE shall issue additional MEMBERSHIP INTERESTS to REGENTS such that REGENTS' allocation percentage with respect to profits and losses continues to equal three percent (3%) as of the FIRST QUALIFIED ROUND (following the conversion of any convertible securities such as convertible debt issued at the FIRST QUALIFIED ROUND). LICENSEE further agrees that as holders of MEMBERSHIP INTERESTS REGENTS shall receive the same anti-dilution treatment as any other MEMBERSHIP INTERESTS held by either of the FOUNDERS as of the date of this Agreement. REGENTS may transfer or direct LICENSEE to transfer an inventor share portion of the MEMBERSHIP INTERESTS to be issued pursuant to this Section 5.1(b)

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under REGENTS' patent policy of the shares otherwise due to REGENTS to the REGENTS' inventors of REGENTS' PATENT RIGHTS notwithstanding the provisions of other contracts associated with the transfer of the shares.

LICENSEE will promptly notify REGENTS following the close of the FIRST QUALIFIED ROUND. Following receipt of notice of the closing of the FIRST QUALIFIED ROUND, REGENTS will promptly notify the LICENSEE upon REGENTS' Office of the President's approval for the equity (the "ACCEPTANCE NOTICE"). If REGENTS' Office of the President does not provide an ACCEPTANCE NOTICE to LICENSEE within [***] ([***)] days following the close of the FIRST QUALIFIED ROUND, then Fifty Thousand U.S. Dollars (\$50,000) shall be due [***] in lieu of the MEMBERSHIP INTERESTS to be issued under this Section 5.1(b).

- 5.2 LICENSEE will also pay to REGENTS a license maintenance fee of Five Thousand U.S. Dollars (\$5,000) on the one (1) year anniversary date of the Effective Date and on each anniversary of the Effective Date thereafter. Notwithstanding the foregoing, the license maintenance fee will not be due and payable on any anniversary of the Effective Date, if on such date the LICENSEE or a sublicensee is selling or otherwise exploiting LICENSED PRODUCTS or LICENSED METHODS, and LICENSEE pays an earned royalty to REGENTS on the NET SALES of such LICENSED PRODUCTS or LICENSED METHODS or a payment on EARNED ROYALTY SUBLICENSE REVENUE.

6. ROYALTIES

- 6.1 LICENSEE will pay to REGENTS earned royalties at the rate of [***] percent ([***)% of NET SALES of LICENSEE, subject to the following:
- (a) If LICENSEE is required to make any payment (including royalties or other license fees) to a third party to obtain any intellectual property rights in the absence of which LICENSEE could not practice REGENTS' PATENT RIGHTS, such third party payments will be credited against royalties owed hereunder by LICENSEE to REGENTS, provided that in no one [***] will the total of such credits reduce earned royalties owed by LICENSEE to REGENTS by more than [***] percent ([***)%).
 - (b) In the event a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD are SOLD to end users, and the total combined royalty burden to LICENSEE on NET SALES (including royalties due to REGENTS under this Agreement and royalties due to third parties on such NET SALES) exceeds [***] percent ([***)%), the earned royalty due to REGENTS will be adjusted, according to the following formula, [***]:

Adjusted royalty = [***]

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For example, [***].

- (c) Only one royalty will be due to REGENTS on any given LICENSED PRODUCT, LICENSED METHOD and LICENSED SERVICE. All amounts paid under this Paragraph 6.1 shall be credited against amounts due for the same LICENSED PRODUCT, LICENSED METHOD or LICENSED SERVICE under Paragraph 6.1 of the OTHER LICENSE AGREEMENT.
- 6.2 Royalties accruing to REGENTS will be paid to REGENTS [***] within [***] ([***)] days after the end of each [***].
- 6.3 Royalties will be payable on NET SALES of LICENSED PRODUCTS, LICENSED METHODS and LICENSED SERVICES covered by VALID CLAIMS of both pending patent applications and issued patents.
- 6.4 LICENSEE will pay to REGENTS milestone payments as follows, provided that all amounts paid under this Paragraph 6.4 shall be credited against amounts due with respect to NON-ROYALTY SUBLICENSE REVENUE pursuant to Paragraph 4.3:
- (a) LICENSEE shall pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD and;
 - (b) LICENSEE shall pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD;
 - (c) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD;
 - (d) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD;
 - (e) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD; and
 - (f) LICENSEE will pay to REGENTS a milestone payment of [***] U.S. Dollars (\$[***)] within [***] ([***)] days of [***] for the first LICENSED PRODUCT or LICENSED METHOD, [***].

Only the milestones listed in this Paragraph 6.4 will be due on any given LICENSED PRODUCT or LICENSED METHOD, even if such milestone is

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payable under this Agreement and under the OTHER LICENSE AGREEMENT. All amounts paid under this Paragraph 6.4 shall be credited against amounts due for the same LICENSED PRODUCT or LICENSED METHOD under Paragraph 6.4 of the OTHER LICENSE AGREEMENT.

- 6.5 Beginning in the first calendar year after the year in which the first occurrence of NET SALES takes place, and each succeeding calendar year thereafter, LICENSEE will pay to the REGENTS a minimum annual royalty of [***] U.S. Dollars (\$[***]), increasing by [***] Dollars (\$[***]) every year thereafter but capped at a total of One Hundred Thousand Dollars (\$100,000) per year in minimum royalties for the remainder of the term of this Agreement. This minimum annual royalty will be paid to REGENTS by [***] of the year following each applicable calendar year and will be credited against by the earned royalties (including royalty payments based on NET SALES and payments based on EARNED ROYALTY SUBLICENSE REVENUE due pursuant to Sections 6.1 and 4.3, respectively) paid for the [***] calendar year for which the minimum payment is made, whether under this Agreement or the OTHER LICENSE AGREEMENT.

Only one minimum annual royalty will be due under this Agreement and under the OTHER LICENSE AGREEMENT. All amounts paid under this Paragraph 6.5 shall be credited against amounts due under Paragraph 6.5 of the OTHER LICENSE AGREEMENT.

- 6.6 All payments due REGENTS will be payable in United States dollars. When LICENSED PRODUCTS, LICENSED SERVICES, or LICENSED METHODS are SOLD for monies other than United States dollars, earned royalties will first be determined in the foreign currency of the country in which the SALE was made and then converted into equivalent United States dollars. The exchange rate will be that rate quoted in the *Wall Street Journal* on the last business day of the reporting period.
- 6.7 In the event that any royalties or other payments due to REGENTS are subject to withholding tax required by applicable law to be paid by LICENSEE to the taxing authority of any foreign country on REGENTS' behalf, LICENSEE may deduct the amount of such tax from the applicable royalties or other payment otherwise payable to REGENTS. In such event, LICENSEE shall pay the taxes to the proper taxing authority and shall send evidence of the obligation together with proof of payment to REGENTS following such payment and shall reasonably cooperate with REGENTS in its efforts to avoid or minimize such withholding obligations and/or to obtain credit for payment thereof. To the extent that such amounts are so withheld and remitted to the proper taxing authority by LICENSEE, such withheld amounts shall be treated for all purposes of this Agreement as having been paid to the party in respect of whom such deduction and withholding was made. LICENSEE will be responsible for all bank transfer charges.

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- 6.8 LICENSEE will make all payments under this Agreement by check payable to “The Regents of the University of California” and sent to REGENTS at the address shown in Article 23 (Notices).
- 6.9 For the avoidance of doubt, if any patent or patent application, or any claim thereof, included within REGENTS’ PATENT RIGHTS expires or is held invalid in a final decision by a court of competent jurisdiction and last resort and from which no appeal has been or can be taken, all obligation to pay royalties based on such patent, patent application or claim, or any claims patentably indistinct therefrom will cease as of the date of such expiration or final decision. LICENSEE will not, however, be relieved from paying any royalties that accrued before such expiration or decision or that are based on another valid patent or claim not expired or involved in such decision.
- 6.10 No royalties will be collected or paid hereunder on LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS distributed to or used by the United States Government. LICENSEE agrees to reduce the amount charged for LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS distributed to the United States Government by an amount equal to the royalty for such LICENSED PRODUCTS otherwise due REGENTS as provided herein.

7. DUE DILIGENCE

- 7.1 LICENSEE, upon execution of this Agreement, will diligently proceed with the development, manufacture, and SALE of LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS, and will diligently market them in quantities sufficient to meet the market demand.
- 7.2 In addition to its obligations under Paragraph 7.1, LICENSEE will perform the following due diligence activities under this Agreement, through itself and/or its sublicensees:
 - (a) [***] within [***] ([***) months after the Effective Date.
 - (b) [***] within [***] ([***) months of [***].
 - (c) [***] within [***] ([***) months after [***].
 - (d) [***] within [***] ([***) months of [***].
 - (e) [***] within [***] ([***) months after [***].

If LICENSEE has failed to meet any of its diligence obligations set forth in Paragraphs 7.1 and 7.2, through itself and/or its sublicensees, as applicable, then REGENTS will so notify LICENSEE in writing of its failure to perform.

- 7.3 LICENSEE will have the right and option to extend the target date of any such due diligence obligation (and each subsequent milestone due thereafter) for a period of

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[***] ([***) months upon the payment of [***] dollars (\$[***) within [***] ([***) days after the date to be extended, for each such extension option exercised by LICENSEE. LICENSEE may further extend the target date of any diligence obligation (and each subsequent milestone due thereafter) for an additional [***] ([***) months upon payment of an additional [***] dollars (\$[***)). These payments are in addition to the minimum royalty payments specified in Paragraph 6.5. Additional extensions may be granted only by mutual written agreement of the parties to this Agreement. In the event that Licensee is unable to meet the timeframes in Paragraph 7.2, as extended by this Paragraph 7.3, despite using diligent efforts to do so, taking into account delays which are due to factors (including technical or regulatory issues) which are outside of the reasonable control of LICENSEE, REGENTS and LICENSEE agree to discuss extending such timeframes and target dates in good faith; *provided, however*, that in no case is REGENTS bound to agree to cumulative extensions longer than [***] ([***) years unless REGENTS concludes in its sole discretion that such an extension is appropriate.

- 7.4 Should LICENSEE opt not to extend such timeframes or fail to use diligent efforts to meet a diligence obligation by the extended target date, then subject to Paragraph 7.6, REGENTS will have the right and option either to terminate this Agreement or to reduce LICENSEE's exclusive license to a non-exclusive royalty-bearing license. This right, if exercised by REGENTS, supersedes the rights granted in Article 3. The right to terminate this Agreement or reduce LICENSEE's exclusive license granted hereunder to a non-exclusive license will be REGENTS' sole remedy for breach of Paragraphs 7.1 or 7.2.
- 7.5 At the request of either party, any controversy or claim arising out of or relating to the diligence provisions of Paragraphs 7.1 and 7.2 will be settled by arbitration conducted in San Francisco, California in accordance with the then current Commercial Arbitration Rules of the American Arbitration Association but such arbitration must be requested by a party within the sixty (60) day cure period set forth in Paragraph 7.6, except as otherwise provided in Paragraph 7.6 or unless the parties mutually agree later to arbitration hereunder. Judgment upon the award rendered by the arbitrator(s) will be binding on the parties and may be entered by either party in any court having jurisdiction. In determination of due diligence, the arbitrator may determine solely the issues of fact or law with respect to LICENSEE's rights under this Agreement but will not have the authority to award monetary damages or grant equitable relief.
- 7.6 To exercise either the right to terminate this Agreement or to reduce the license to a non-exclusive license for lack of diligence under Paragraphs 7.1 or 7.2, REGENTS will give LICENSEE written notice of the deficiency. LICENSEE thereafter has sixty (60) days to cure the deficiency or to request arbitration in accordance with Paragraph 7.5. If REGENTS has not received a written request for arbitration or satisfactory tangible evidence that the deficiency has been cured by the end of the sixty (60) day period, then REGENTS may, at its option, either

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terminate this Agreement or reduce LICENSEE's exclusive license to a non-exclusive license by giving further written notice to LICENSEE. These notices will be subject to Article 23 (Notices). Notwithstanding the foregoing, in the event that LICENSEE disputes in good faith whether the deficiency was timely cured, it may seek resolution of such dispute pursuant to Article 7.5, and in such event, no termination of this Agreement pursuant to this Article 7.6 may occur unless and until completion of such dispute resolution results in a determination that such deficiency has not been timely cured.

8. PROGRESS AND ROYALTY REPORTS

- 8.1 For each [***] period beginning July 1, 2014, LICENSEE will submit to REGENTS a [***] progress report covering LICENSEE's activities related to the development and testing of all LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS and the obtaining of necessary governmental approvals, if any, for marketing in the United States. These progress reports will be made for all development activities until the first SALE occurs in the United States.
- 8.2 Each progress report will be a sufficiently detailed summary of activities of LICENSEE and any sublicensees so that REGENTS may evaluate and determine LICENSEE's progress in development of LICENSED PRODUCTS, LICENSED SERVICES, and LICENSED METHODS, and in meeting its diligence obligations under Article 7, and will include (but not be limited to) the following: summary of work completed and in progress; current schedule of anticipated events and milestones, including diligence milestones under Paragraph 7.2; anticipated market introduction dates for the LICENSED TERRITORY; and sublicensees' activities during the reporting period.
- 8.3 LICENSEE also will report to REGENTS in its subsequent progress and royalty reports, the date of first SALE.
- 8.4 After the first SALE anywhere in the world, LICENSEE will make [***] royalty reports to REGENTS within [***] ([***)] days after [***]. Each such royalty report will include at least the following:
- (a) The number of LICENSED PRODUCTS manufactured and the number SOLD;
 - (b) Gross revenue from SALE of LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS;
 - (c) NET SALES pursuant to Paragraph 2.6;
 - (d) Total royalties due REGENTS; and
 - (e) Names and addresses of any new sublicensees.

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8.5 If no SALES have occurred during the reporting period, a statement to this effect is required in the royalty report for that period.

8.6 All reports under this Article 8 shall be treated as confidential information of LICENSEE.

9. BOOKS AND RECORDS

9.1 LICENSEE will keep full, true, and accurate books and records containing all particulars that are necessary for the purpose of showing the amount of royalties payable to REGENTS and LICENSEE's compliance with other obligations under this Agreement. Said books and records will be kept at LICENSEE's principal place of business or the principal place of business of the appropriate division of LICENSEE to which this Agreement relates. Said books and records and the supporting data will be open at all reasonable times during normal business hours upon reasonable notice, for [***] ([***)] years following the end of the calendar year to which they pertain, for the inspection and audit by a mutually acceptable independent auditor engaged by REGENTS for the purpose of verifying LICENSEE's royalty statement or compliance in other respects with this Agreement. Such auditor will be bound to hold all information in confidence except as necessary to communicate LICENSEE's non-compliance with this Agreement to REGENTS.

9.2 The fees and expenses of REGENTS' mutually acceptable independent auditor performing such an examination will be borne by REGENTS. However, if an error in underpaid royalties to REGENTS of more than [***] percent ([***)% of the total royalties due for any year is discovered, then the fees and expenses of such auditor will be borne by LICENSEE.

10. LIFE OF THE AGREEMENT

10.1 Unless otherwise terminated by the operation of law or by acts of the parties in accordance with the terms of this Agreement, this Agreement will be in force from the Effective Date and will remain in effect until the expiration of the last VALID CLAIM under this Agreement.

10.2 Any termination of this Agreement shall not affect the rights and obligations set forth in the following articles or paragraphs:

Article 2 Definitions

Article 4 Sublicenses (only as to Paragraphs 4.2 and 4.7)

Article 9 Books and Records

Article 10 Life of the Agreement (only as to Paragraphs 10.2 and 10.3)

Article 13 Disposition of Licensed Products Upon Termination

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- Article 16 Use of Names and Trademarks
- Article 17 Limited Warranties
- Article 19 Indemnification and Insurance
- Article 23 Notices
- Article 24 Late Payments (only as to outstanding payments)
- Article 26 Confidentiality
- Article 28 Severability
- Article 29 Applicable Law; Venue; Attorney's Fees

10.3 Any termination of this Agreement will not relieve LICENSEE of its obligation to pay any monies due or owing at the time of such termination and will not relieve any obligations, of either party to the other party, established prior to termination.

11. TERMINATION BY REGENTS

11.1 Except for breach of diligence obligations, which is set forth in Article 7, if LICENSEE should violate or fail to perform any term of this Agreement, then REGENTS may give written notice of such default ("Notice of Default") to LICENSEE. If LICENSEE should fail to repair such default within sixty (60) days of the effective date of such notice, REGENTS will have the right to terminate this Agreement, and the licenses herein, by a second written notice ("Notice of Termination") to LICENSEE. If a Notice of Termination is sent to LICENSEE, this Agreement will automatically terminate on the effective date of such notice. Such termination will not relieve LICENSEE of its obligation to pay any royalty or license fees accrued at the time of such termination and will not impair any accrued rights of REGENTS. These notices will be subject to Article 23 (Notices).

12. TERMINATION BY LICENSEE

- 12.1 LICENSEE will have the right at any time to terminate this Agreement in whole or as to any portion of REGENTS' PATENT RIGHTS by giving notice in writing to REGENTS. Such notice of termination will be subject to Article 23 (Notices) and termination of this Agreement will be effective ninety (90) days after the effective date of such notice.
- 12.2 Any termination pursuant to Paragraph 12.1 will not relieve LICENSEE of any obligation or liability accrued hereunder prior to such termination or rescind anything done by LICENSEE or any payments made to REGENTS hereunder prior to the time such termination becomes effective, and such termination will not affect in any manner any rights of REGENTS arising under this Agreement prior to such termination.

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13. DISPOSITION OF LICENSED PRODUCTS UPON TERMINATION

- 13.1 Upon termination of this Agreement by either party, for a period of [***] ([***)] days after the date of termination, LICENSEE may complete and SELL any partially made LICENSED PRODUCTS and continue to render any previously commenced LICENSED SERVICES, and continue the practice of LICENSED METHODS; provided, however, that all such SALES will be subject to the terms of this Agreement including, but not limited to, the payment of royalties at the rate and at the time provided herein and the rendering of reports thereon.

14. PATENT PROSECUTION AND MAINTENANCE

- 14.1 REGENTS will diligently prosecute and maintain the United States and foreign patent applications and patents under REGENTS' PATENT RIGHTS, subject to LICENSEE'S reimbursement of REGENTS' out of pocket costs under Article 14.3 below. All patent applications and patents under REGENTS' PATENT RIGHTS will be held in the name of REGENTS. REGENTS will have sole responsibility for retaining and instructing patent counsel, but continued use of such counsel at any point in the patent prosecution process, subsequent to the initial filing of a U.S. patent application covering the INVENTION, shall be subject to the approval of LICENSEE. If LICENSEE rejects [***] of REGENTS' choice of prosecution counsel, then REGENTS may select new prosecution counsel without LICENSEE's consent. REGENTS shall promptly provide LICENSEE with copies of all relevant documentation, including all responses at least [***] ([***)] days prior to the anticipated filing deadline to the extent such advance notice is available, so that LICENSEE may be currently informed and apprised of the continuing prosecution of the REGENTS' PATENT RIGHTS. LICENSEE agrees to keep this documentation confidential in accordance with Article 26. LICENSEE may comment upon such documentation, and REGENTS will reasonably consider all such comments made by LICENSEE; provided, however, that if LICENSEE has not commented upon such documentation in reasonable time for REGENTS to sufficiently consider LICENSEE's comments prior to the deadline for filing a response with the relevant government patent office, REGENTS will be free to respond appropriately without consideration of LICENSEE's comments. LICENSEE and LICENSEE's patent counsel will have the right to consult with patent counsel chosen by REGENTS. REGENTS will file foreign counterparts of the REGENTS' PATENT RIGHTS in countries selected by LICENSEE, subject to Paragraph 14.4.
- 14.2 REGENTS will use reasonable efforts to prepare or amend any patent application to include claims reasonably requested by LICENSEE to protect the LICENSED PRODUCTS, LICENSED SERVICES and LICENSED METHODS contemplated to be SOLD or to be practiced under this Agreement. REGENTS will not abandon a patent application (unless filing a continuation or divisional filing or an equivalent thereof) or fail to maintain a patent without LICENSEE's prior written consent.

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- 14.3 Subject to Paragraph 14.4, all past, present, and future costs for preparing, filing, prosecuting, and maintaining all United States and foreign patent applications and patents under REGENTS' PATENT RIGHTS will be borne by LICENSEE, so long as the licenses granted to LICENSEE herein are exclusive. If, however, REGENTS reduces the exclusive licenses granted herein to non-exclusive licenses pursuant to Paragraph 7.6, and REGENTS grants additional license(s), the costs of preparing, filing, prosecuting and maintaining such patent applications and patents will be divided equally among the licensed parties from the effective date of each subsequently granted license agreement. Payments are due within [***] ([***)] days after receipt of invoice from REGENTS.
- 14.4 LICENSEE's obligation to underwrite and to pay all domestic and foreign patent filing, prosecution, and maintenance costs will continue for so long as this Agreement remains in effect; provided, however, that LICENSEE may terminate its obligations with respect to any given patent application or patent in any or all designated countries upon [***] ([***)] months' written notice to REGENTS. REGENTS will use its best efforts to curtail patent costs when such a notice is received from LICENSEE. REGENTS may continue prosecution and/or maintenance of such applications or patents at its sole discretion and expense; provided, however, that LICENSEE will have no further right or licenses thereunder.

15. MARKING

- 15.1 Prior to the issuance in the United States of patents under REGENTS' PATENT RIGHTS, LICENSEE agrees to mark LICENSED PRODUCT(S) (or their containers or labels) SOLD by it in the United States under the license granted in this Agreement with the words "Patent Pending," and following the issuance in the United States of one or more patents under REGENTS' PATENT RIGHTS, with the patent numbers of the REGENTS' PATENT RIGHTS. All LICENSED PRODUCTS SOLD in other countries will be marked in such manner as to conform with the patent laws and practice of such countries.

16. USE OF NAMES AND TRADEMARKS

- 16.1 Nothing contained in this Agreement will be construed as conferring any right to use in advertising, publicity or other promotional activities any name, trademark, trade name, or other designation of either party hereto by the other (including any contraction, abbreviation, or simulation of any of the foregoing). Unless required by law, regulation, or rules of a securities exchange, or consented to in writing by REGENTS, the use by LICENSEE of the name "The Regents of the University of California" or the name of any University of California campus in advertising, publicity or other promotional activities is expressly prohibited.

17. LIMITED WARRANTIES

- 17.1 REGENTS warrants to LICENSEE that (a) to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement, it has the lawful right to grant the licenses granted to LICENSEE pursuant to this Agreement, (b) to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement, it has not previously granted to any third party any rights that conflict with the licenses granted to LICENSEE pursuant to this Agreement, and (c) to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement and of REGENTS' patent prosecution counsel, no third party who is not designated in filings with relevant patent authorities as an inventor of the REGENTS' PATENT RIGHTS is, or has claimed or asserted in writing to REGENTS that it is, an inventor of the REGENTS' PATENT RIGHTS.
- 17.2 Except as expressly provided in this Agreement, the licenses granted pursuant to this Agreement, the BIOLOGICAL MATERIAL, and the associated INVENTION are provided WITHOUT WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED. REGENTS MAKES NO REPRESENTATION OR WARRANTY THAT THE INVENTION, THE BIOLOGICAL MATERIAL, REGENTS' PATENT RIGHTS, LICENSED PRODUCTS, LICENSED SERVICES OR LICENSED METHODS WILL NOT INFRINGE ANY PATENT OR OTHER PROPRIETARY RIGHT.
- 17.3 EXCEPT FOR LICENSEE'S OBLIGATION TO INDEMNIFY AGAINST CLAIMS OF THIRD PARTIES UNDER ARTICLE 19 (INDEMNIFICATION AND INSURANCE), IN NO EVENT WILL EITHER PARTY BE LIABLE TO THE OTHER FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM EXERCISE OF THE LICENSES GRANTED PURSUANT TO THIS AGREEMENT OR THE USE OF THE INVENTION, THE BIOLOGICAL MATERIAL, REGENTS' PATENT RIGHTS, LICENSED METHODS, LICENSED SERVICES OR LICENSED PRODUCTS. THE REGENTS WILL NOT BE LIABLE FOR DIRECT DAMAGES TO THE OTHER PARTY CAUSED BY AN ASSIGNMENT BY THE REGENTS' INVENTORS OF THE REGENTS' PATENT RIGHTS TO A THIRD PARTY.
- 17.4 Nothing in this Agreement is or will be construed as:
- (a) A warranty or representation by REGENTS as to the validity, enforceability or scope of any REGENTS' PATENT RIGHTS; or
 - (b) A warranty or representation that anything made, used, or SOLD under any license granted in this Agreement is or will be free from infringement of patents of third parties; or

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- (c) An obligation to bring or prosecute actions or suits against third parties for patent infringement, except as provided in Article 18; or
- (d) Conferring by implication, estoppel, or otherwise any license or rights under any patents of REGENTS other than REGENTS' PATENT RIGHTS as defined herein, regardless of whether such patents are dominant or subordinate to REGENTS' PATENT RIGHTS; or
- (e) An obligation to furnish any know-how not provided in the patents and patent applications under REGENTS' PATENT RIGHTS and REGENTS' PROPERTY RIGHTS.

18. PATENT INFRINGEMENT

18.1 In the event that either party (and in the case of REGENTS, to the extent of the actual knowledge of the licensing professional responsible for administration of this Agreement) learns of the infringement of any REGENTS' PATENT RIGHTS under this Agreement, such party will promptly provide the other party with notice and reasonable evidence of such infringement ("Infringement Notice"). During the period and in a jurisdiction where LICENSEE has exclusive rights under this Agreement, neither party will notify a third party, including the infringer, of the infringement without first obtaining consent of the other party, which consent will not be unreasonably withheld; provided, however, that LICENSEE may notify any then-existing sublicensees under the relevant REGENTS' PATENT RIGHTS of such infringement without REGENTS' prior consent if such sublicensee is bound by obligations of confidentiality with respect to such information. Both parties will use diligent efforts, in cooperation with each other, to terminate such infringement without litigation.

18.2 If the infringing activity of potential commercial significance has not been abated within [***] ([***)] days following the effective date of the Infringement Notice, LICENSEE may institute suit for patent infringement against the infringer. REGENTS may voluntarily join such suit at its own expense, but may not thereafter commence suit against the infringer for the acts of infringement that are the subject of LICENSEE's suit or any judgment rendered in that suit. [***] If, in a suit initiated by LICENSEE, REGENTS is involuntarily joined [***].

If, within [***] ([***)] days following the effective date of the Infringement Notice, the infringing activity of potential commercial significance has not been abated and LICENSEE has not brought suit against the infringer, REGENTS may institute suit for patent infringement against the infringer. If REGENTS institutes such suit, LICENSEE may not join such suit without REGENTS' consent and may not thereafter commence suit against the infringer for the acts of infringement that are the subject of REGENTS' suit or any judgment rendered in that suit.

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Notwithstanding the foregoing, the parties may by mutual agreement, at any time, bring and control such suit jointly against an infringer of the REGENTS' PATENT RIGHTS, sharing costs in such manner as they may then agree.

- 18.3 Such legal action as is decided upon will be at the expense of the party instituting the suit pursuant to Paragraph 18.2, and all recoveries recovered thereby will [***], provided that legal action brought jointly by REGENTS and LICENSEE, and participated in by both, will be [***] and all recoveries will be allocated in the following order: (a) to each party pro rata reimbursement of the attorney's costs, fees, and other related expenses to the extent each party paid for such costs, fees, and expenses, until all such costs, fees, and expenses are reimbursed to each party; and (b) [***].
- 18.4 Each party will cooperate with the other in litigation instituted hereunder but at the expense of the party instituting the suit pursuant to Paragraph 18.2. Such litigation will be controlled by the party instituting such suit, but the other party may be represented by counsel of its choice. In no event may either party admit liability or wrongdoing on behalf of the other party without the other party's prior written consent.
- 18.5 Any agreement made by LICENSEE for the purposes of settling litigation or other dispute shall comply with the requirements of Article 4 (Sublicenses) of this Agreement.

19. INDEMNIFICATION AND INSURANCE

- 19.1 LICENSEE will, and will require its sublicensees to, indemnify, hold harmless, and defend REGENTS and its officers, employees, and agents; sponsor(s) of the research that led to the INVENTION and BIOLOGICAL MATERIAL included in REGENTS' PROPERTY RIGHTS; and the inventors of any patents and patent applications under REGENTS' PATENT RIGHTS and their employers against any and all losses, damages, costs, fees, and expenses resulting from third party claims and suits arising out of exercise of this license or any sublicense or any use or possession of the BIOLOGICAL MATERIAL. This indemnification will include, but not be limited to, any product liability claims.
- 19.2 LICENSEE, at its sole cost and expense, will ensure that the applicable entity performing activities in connection with any work performed hereunder, whether LICENSEE, an AFFILIATE, or a sublicensee, will obtain, keep in force, and maintain the following insurance:
 - (a) prior to the start of clinical trials of a LICENSED PRODUCT, Commercial Form General Liability Insurance (contractual liability included) with limits as follows:

Each Occurrence	\$[***]
Products/Completed Operations Aggregate	\$[***]
Personal and Advertising Injury	\$[***]
General Aggregate	\$[***]

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- (b) upon the start of any clinical trials of a LICENSED PRODUCT, Commercial Form General Liability Insurance (contractual liability included), and product liability insurance if not otherwise included, with limits as follows:

Each Occurrence	\$[***]
Products/Completed Operations Aggregate	\$[***]
Personal and Advertising Injury	\$[***]
General Aggregate	\$[***]

- (c) upon the first commercial sale of a LICENSED PRODUCT, LICENSED SERVICE or LICENSED METHOD, Commercial Form General Liability Insurance (contractual liability included), and product liability insurance if not otherwise included, with limits as follows:

Each Occurrence	\$[***]
Products/Completed Operations Aggregate	\$[***]
Personal and Advertising Injury	\$[***]
General Aggregate	\$[***]

If the above insurance is written on a claims-made form, it shall continue for [***] ([***)] years following termination or expiration of this Agreement.

- (d) worker's compensation as legally required in the jurisdiction in which LICENSEE, an AFFILIATE, or a sublicensee, as applicable, is doing business.

LICENSEE will promptly notify REGENTS of any material reduction in the insurance coverages below the amounts required hereunder.

- 19.3 The coverage and limits referred to in Paragraph 19.2 above will not in any way limit the liability of LICENSEE under Paragraph 19.1. Upon the execution of this Agreement, LICENSEE will furnish REGENTS with certificates of insurance evidencing compliance with all requirements. Such certificates will:

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- (a) where possible, provide for [***] ([***] days' ([***] ([***] days for non-payment of premium) advance written notice to REGENTS of any cancellation of insurance coverages;
- (b) indicate that REGENTS has been endorsed as an additional insured under the coverage described above in Paragraph 19.2; and
- (c) include a provision that the coverage will be primary and will not participate with, nor will be excess over, any valid and collectable insurance or program of self-insurance maintained by REGENTS.

19.4 REGENTS will promptly notify LICENSEE in writing of any claim or suit brought against REGENTS for which REGENTS intends to invoke the provisions of Paragraph 19.1. LICENSEE will keep REGENTS informed of its defense of any claims pursuant to Paragraph 19.1, and REGENTS will cooperate reasonably in any such suit. If REGENTS invokes the provisions of Paragraph 19.1, REGENTS will not make any admissions or take any actions in such claim or suit that may prejudice or impair LICENSEE's ability to defend such claim or suit without LICENSEE's prior written consent, and LICENSEE will not admit liability or wrongdoing on behalf of REGENTS without REGENTS' prior written consent.

20. COMPLIANCE WITH LAWS

20.1 LICENSEE will comply with all applicable international, national, state, regional, and local laws and regulations in performing its obligations hereunder and in its use, manufacture, SALE or import of the LICENSED PRODUCTS, LICENSED SERVICES, or practice of the LICENSED METHODS. LICENSEE understands that REGENTS is subject to United States laws and regulations (including the Arms Export Control Act, as amended, and the Export Administration Act of 1979), controlling the export of technical data, computer software, laboratory prototypes and other commodities, and REGENTS' obligations under this Agreement are contingent on compliance with such laws and regulations. The transfer of certain technical data and commodities may require a license from the cognizant agency of the United States Government and/or written assurances by LICENSEE that LICENSEE will not export such technical data and/or commodities to certain foreign countries without prior approval of such agency. REGENTS neither represents that a license will not be required nor that, if required, it will be issued.

21. GOVERNMENT APPROVAL OR REGISTRATION

21.1 If this Agreement or any associated transaction is required by the law of any nation to be either approved or registered with any governmental agency, LICENSEE will assume all legal obligations to do so. LICENSEE will notify REGENTS if it becomes aware that this Agreement is subject to a United States or foreign government reporting or approval requirement. LICENSEE will make all necessary filings and pay all costs including fees, penalties, and all other out-of-pocket costs associated with such reporting or approval process.

[***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

22. ASSIGNMENT

22.1 This Agreement is binding upon and shall inure to the benefit of REGENTS, and its successors and assigns. This Agreement will be personal to LICENSEE and assignable by LICENSEE only with the written consent of REGENTS, except that LICENSEE may freely assign this Agreement to its AFFILIATE or to an acquirer of all or substantially all of LICENSEE's stock, assets or business to which this Agreement relates. If LICENSEE assigns this Agreement to a non-AFFILIATE third party, then upon execution of the assignment agreement, LICENSEE will (i) provide REGENTS with the updated contact information, and [***].

23. NOTICES

23.1 All notices under this Agreement will be deemed to have been fully given and effective when done in writing and delivered in person, or three (3) business days after mailed by registered or certified U.S. mail, or one (1) business day after deposited with an express carrier service requiring signature by recipient, and addressed as follows:

To REGENTS: Office of Technology Licensing
2150 Shattuck Avenue, Suite 510
Berkeley, CA 94704-1347
Attn.: Director (UC Case No.: B13-135)

To LICENSEE: 4D Molecular Therapeutics LLC
444 Laverne Avenue
Mill Valley, CA 94941
Attn.: [***]

Either party may change its address upon written notice to the other party.

24. LATE PAYMENTS

24.1 If monies owed to REGENTS under this Agreement are not received by REGENTS when due, LICENSEE will pay to REGENTS interest charges at a rate of [***] percent ([***]%) per annum, or less if required by applicable law. Such interest will be calculated from the date payment was due until actually received by REGENTS. Such accrual of interest will be in addition to, and not in lieu of, enforcement of any other rights of REGENTS related to such late payment. Acceptance of any late payment will not constitute a waiver under Article 25 (Waiver) of this Agreement.

25. WAIVER

25.1 The failure of either party to assert a right hereunder or to insist upon compliance with any term or condition of this Agreement will not constitute a waiver of that right or excuse a similar subsequent failure to perform any such term or condition

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by the other party. None of the terms and conditions of this Agreement can be waived except by the written consent of the party waiving compliance.

26. CONFIDENTIALITY

- 26.1 Each party will hold the other party's proprietary business and technical information, patent prosecution material and other proprietary information, including the negotiated terms of this Agreement, in confidence and against disclosure to third parties (except to those employees or authorized representatives having a need to know such information and who are bound by confidentiality obligations with respect thereto) with at least the same degree of care as it exercises to protect its own data and license agreements of a similar nature. Each party will only use such information of the other party in accordance with the terms of this Agreement. These obligations will expire [***] ([***)] years after the termination or expiration of this Agreement.
- 26.2 Nothing contained herein will in any way restrict or impair the right of LICENSEE or REGENTS to use, disclose, or otherwise deal with any information or data which:
- (a) at the time of disclosure to the receiving party is generally available to the public or thereafter becomes generally available to the public by publication or otherwise, through no act or omission of the receiving party;
 - (b) the receiving party can show by its contemporaneous written records was in its possession, without confidentiality restrictions, prior to the time of disclosure to it hereunder, and was not acquired directly or indirectly from the disclosing party;
 - (c) is independently made available to the receiving party, without confidentiality restrictions, as a matter of right by a third party under no obligation of confidentiality to the disclosing party;
 - (d) is independently developed by the receiving party without any use of the information disclosed, as shown by the receiving party's contemporaneous written records; or
 - (e) is subject to disclosure under the California Public Records Act, court order, or other requirements of law, regulation, or rules of a securities exchange, provided that the receiving party promptly informs the disclosing party of such request.
- 26.3 Notwithstanding anything to the contrary in Paragraph 26.1, LICENSEE may disclose proprietary information it receives pursuant to this Agreement, and the terms of this Agreement, to its actual or potential investors, acquirers, and sublicensees who are bound by obligations of confidentiality with respect thereto. REGENTS will be free to release to the inventors, and senior administrators

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employed by REGENTS the terms and conditions of this Agreement upon their request. If such request is made, REGENTS will inform such employees of the confidentiality obligations set forth above and will request that they do not disclose such terms and conditions to others. Should a third party inquire whether a license to REGENTS' PATENT RIGHTS is available, REGENTS may disclose the existence of this Agreement and the extent of the grant in Articles 3 and 4 to such third party, but will not disclose the name of LICENSEE unless LICENSEE has already made such disclosure publicly, except where REGENTS is required to release information under either the California Public Records Act or other applicable law, provided REGENTS gives prior written notice to LICENSEE of such disclosure.

26.4 LICENSEE and REGENTS agree to destroy or return to the disclosing party proprietary information received from the other in its possession within [***] ([***)] days following the effective date of termination of this Agreement. However, each party may retain one copy of proprietary information of the other solely for archival purposes in non-working files for the sole purpose of verifying the ownership of the proprietary information, provided such proprietary information will be subject to the confidentiality provisions set forth in this Article 26. LICENSEE and REGENTS agree to provide each other, within [***] ([***)] days following termination of this Agreement, with a written notice that such proprietary information has been returned or destroyed.

27. FORCE MAJEURE

27.1 Except for LICENSEE's obligation to make any payments to REGENTS hereunder, the parties to this Agreement shall be excused from any performance required hereunder if such performance is rendered impossible or unfeasible due to any catastrophes or other major events beyond their reasonable control, including, without limitation, war, riot, and insurrection; laws, proclamations, edicts, ordinances, or regulations; strikes, lockouts, or other serious labor disputes; and floods, fires, explosions, or other natural disasters. When such events have abated, the parties' respective obligations hereunder will resume.

28. SEVERABILITY

28.1 The provisions of this Agreement are severable, and in the event that any provision of this Agreement will be determined to be invalid or unenforceable under any controlling body of law, such invalidity or enforceability will not in any way affect the validity or enforceability of the remaining provisions hereof.

29. APPLICABLE LAW; VENUE; ATTORNEYS' FEES

29.1 THIS AGREEMENT WILL BE CONSTRUED, INTERPRETED, AND APPLIED IN ACCORDANCE WITH THE LAWS OF THE STATE OF CALIFORNIA, excluding any choice of law rules that would direct the application of the laws of another jurisdiction, but the scope and validity of any patent or patent application

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under REGENTS' PATENT RIGHTS will be determined by the applicable law of the country of such patent or patent application. Any legal action brought by the parties relating to this Agreement will be conducted in San Francisco, California. The prevailing party in any legal action under this Agreement will be entitled to recover its reasonable attorneys' fees in addition to its costs and necessary disbursements.

30. ELECTRONIC COPY; COUNTERPARTS

- 30.1 The parties to this document agree that a copy of the original signature to this Agreement (including an electronic copy) may be used for any and all purposes for which the original signature may have been used. The parties further waive any right to challenge the admissibility or authenticity of this document in a court of law based solely on the absence of an original signature.
- 30.2 This Agreement may be executed in two or more counterparts, including by facsimile or electronic exchange of signed copies in PDF format, each of which shall be deemed an original document, and all of which, together with this writing, shall be deemed one instrument.

31. SCOPE OF AGREEMENT; AMENDMENT; WAIVER

- 31.1 This Agreement, together with the OTHER LICENSE AGREEMENT and the MTA, incorporates the entire agreement between the parties with respect to the subject matter hereof, and supersedes all prior agreements, discussions and writings in respect thereof, including without limitation the Letter Agreement dated May 8, 2013.
- 31.2 This Agreement may be altered or modified only by written amendment duly executed by the parties hereto. A waiver of any breach or default of this Agreement shall not constitute a waiver of any other right hereunder or any subsequent breach or default.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in duplicate originals by their duly authorized officers or representatives.

THE REGENTS OF THE UNIVERSITY, OF CALIFORNIA

4D MOLECULAR THERAPEUTICS LLC

By /s/ Carol Mimura
Carol Mimura, Ph.D.
Assistant Vice Chancellor
Office of Technology Licensing

By /s/ David H. Kim
Printed Name David H. Kim

Title Co-Founder, Executive Chair

Date Dec. 19, 2013

Date December 19, 2013



March 20, 2015

David Kim, MD

Dear David:

Position. We are pleased to confirm the terms of the offer to you to join 4D Molecular Therapeutics, Inc. (the “*Company*”) as an employee, in the position of Chief Executive Officer and President. In this role, you will be reporting to the Board of Directors of the Company. You will have the customary duties and responsibilities of the position and such other reasonable duties and responsibilities as shall be assigned to you from time to time. You agree to devote at least 90% of your full business time and best efforts to the performance of your duties to the Company. You may commit up to 10% of your remaining standard business hours time towards non-competitive external consulting and teaching efforts, including but not limited to academic and charitable activities, and consulting and/or board positions with respect to the business of an oncolytic vaccinia cancer company and an oncolytic HSV cancer company. In performing the duties of your role, you agree to be on-site at the Company’s office at least three days a week on average, with the ability to work off-site the remainder of your scheduled work time.

Compensation/Benefits. Your effective start date was March 20, 2015. Your annual base compensation will be \$375,000 per year, less applicable withholdings and deductions. You will be paid according to this annual base compensation starting on August 1, 2015. Prior to Aug 1, 2015 you agree to be paid a reduced monthly rate of \$20,833. In addition, after the Company has raised at least \$17 million dollars (USD) in total, you will be eligible to receive a performance bonus equal to up to 40% of your annual base compensation, as determined by the Board of Directors. You are also eligible to receive employee benefits (medical, dental and personal time off) according to the terms of the applicable Company policy or benefit plan, as in effect or amended from time to time. Wages are paid semi-monthly in accordance with the Company’s normal payroll procedures. Your salary, bonus and equity incentive compensation will be reviewed in connection with an initial public offering and at least annually by the Board of Directors, in each case on the same basis as other senior executives in the Company.

Severance. In the event of (a) termination without Cause and conditioned upon your exercise of a general release in customary form acceptable to the Company (a “*Release*”) within 60 days of any such termination or (b) resignation for Good Reason and conditioned upon your exercise of a Release within 60 days of such resignation, you will be entitled to receive a severance payment, to be paid in lump sum, of twelve months’ base compensation and a pro rata portion of any determinable cash bonus compensation plan then in effect, subject to required withholdings and deductions. For the period of twelve (12) months following the date of termination of your employment with the Company, you, and where applicable, your spouse and eligible dependents, will continue to be eligible to receive medical coverage under the Company’s medical plans subject to and in accordance with the terms of the applicable plan documents; provided, that in order to receive such continued coverage at such rates, you will be required to pay the applicable premiums to the plan provider, and the Company will reimburse you, within sixty (60) days following the date such monthly premium payment is due, an amount equal to the monthly COBRA premium payment, less applicable tax withholdings. Notwithstanding the foregoing, if you obtain employment during this twelve (12) month period that entitles you and your spouse and eligible dependents to comprehensive medical coverage, you must notify the Company, and no further reimbursements will be paid by the Company to you pursuant to this paragraph. Notwithstanding the above, if the Company determines in its sole discretion that it cannot provide the foregoing COBRA benefits without potentially violating applicable law, the Company shall in lieu thereof provide to you a taxable lump-sum payment in an amount equal to the monthly (or then remaining) COBRA premium that you would be required to pay to continue your group health coverage in effect on the date of termination of your employment with the Company (which amount shall be based on the premium for the first month of COBRA coverage). “*COBRA*” means the Consolidated Omnibus Budget Reconciliation Act of 1986, as amended.

- A. a “*Change of Control*” shall mean (i) any “person” (as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended) is or becomes the “beneficial owner” (as defined in Rule 13d-3 under said Act), directly or indirectly, of securities of the Company representing more than 50% of the total voting power represented by the Company’s then

outstanding voting securities; or (ii) the date of the consummation of a merger or consolidation of the Company with any other corporation that has been approved by the stockholders of the Company, other than a merger or consolidation which would result in the voting securities of the Company outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into voting securities of the surviving entity or its parent) at least fifty percent (50%) of the total voting power represented by the voting securities of the Company or such surviving entity or its parent outstanding immediately after such merger or consolidation; or (iii) the date of the consummation of the sale or disposition by the Company of all or substantially all the Company's assets. Notwithstanding the foregoing provisions of this definition, a transaction will not be deemed a Change of Control unless the transaction qualifies as a "change in control event" within the meaning of Section 409A of the Internal Revenue Code of 1986, as amended ("**Code**").

- B. "**Cause**" shall mean: (i) your material failure to perform your principal assigned duties or responsibilities as a Service Provider (as defined in the Company's 2015 Equity Incentive Plan) (other than a failure resulting from your Disability (as defined in Section 22(e)(3) of the Code); *provided*, that, the failure of you to achieve certain results, such as the Company's business plan, in and of itself, would not constitute "Cause"; (ii) your engaging in any act of dishonesty, fraud or material misrepresentation; (iii) your violation of any federal or state law or regulation applicable to the business of the Company or its affiliates which results in or could reasonably be expected to result in harm or creates material risk to the Company, as determined by the Board of Directors; (iv) your breach of any confidentiality agreement or invention assignment agreement, or any other material contract between you and the Company (or any affiliate of the Company) or violation of any of the written policies of the Company (or any affiliate of the Company); or (v) your being convicted of, or entering a plea of nolo contendere to, any crime or committing any act of moral turpitude. The Company shall not terminate you for Cause pursuant to clause "(i)" above) without first providing you with written notice of the acts or omissions constituting the grounds for such termination and if in the reasonable judgment of the Company such failure may be cured within thirty days, expiration of a reasonable cure period not to exceed 30 days following the date of such notice.
- C. "**Good Reason**" resignation shall mean your voluntary termination of your employment following the occurrence of one or more of the following, without your express written consent and the failure of the Company to cure such Good Reason, all pursuant to this paragraph:
- (a) the Company's offices move more than 50 miles away from their current location;
 - (b) Removal from the Company's Board of Directors;
 - (c) any material and adverse change including any material diminution in your title, duties, authority or responsibilities, but excluding changes in your title, duties, authority, responsibilities, and reporting relationships in the event of a Change of Control; provided your remaining duties and responsibilities are consistent with industry norms for the title of Chief Executive Officers of companies, subsidiaries or divisions of similar size and circumstances;
 - (d) the assignment to you of duties materially inconsistent with your position with the Company;
 - (e) a reduction in your base salary or annual bonus target opportunities other than pursuant to a reduction in compensation that applies to all executive officers; or
 - (f) any material breach by the Company of this Agreement.

The Board of Directors will be given not less than 30 days' written notice by you (within 20 days of the occurrence of the event constituting Good Reason) of your intention to terminate your employment for Good Reason, such notice to state in detail the particular act or acts or failure or failures to act that constitute the grounds on which the proposed termination for Good Reason is based and proposed actions to provide a sufficient cure of such act or acts, or failure or failures to act, and such termination shall be effective at the expiration of such notice period only if the Company has not materially cured such act or acts or failure or failures to act that give rise to Good Reason during such period. Notwithstanding the foregoing, the Company in its sole election may waive any cure periods and your termination will be effective on such earlier date determined by the Board of Directors.

No Conflicts. By signing below, you agree that there is no lawful reason to prevent you from accepting a position with the Company. We also ask that, if you have not already done so, you disclose to the Company any and all agreements relating to your prior employment that may affect your eligibility to be employed by the Company or limit the manner in which you may be employed by the Company. It is the Company's understanding that any such agreements will not prevent you from performing the duties of your position with the Company, and you represent that such is the case.

Company Policies. As a Company employee, you will be expected to abide by the Company's rules and policies which may change from time to time in accordance with applicable laws.

Confidential Information/Nondisclosure/Nonsolicitation of Employees. As a condition of your employment with the Company, you will be required to sign the Company's Confidential Information and Invention Assignment Agreement, a copy of which is enclosed (the "**Confidentiality Agreement**").

At-Will Employment. Your employment is at will, which means that either you or the Company can terminate your employment with the Company at any time with or without notice and with or without cause. Nothing in this letter or the Confidentiality Agreement (as defined below) shall be construed to alter the at-will nature of your employment relationship with the Company.

Conditions to Employment. For purposes of federal immigration law, you are required, as a condition of employment, to provide to the Company documentary evidence of your identity and eligibility for employment in the United States. Such documentation must be provided to us within three (3) business days of your date of hire or our employment relationship with you may be terminated.

No Duty to Mitigate. You are under no contractual or legal obligation to mitigate your damages in order to receive the severance benefits provided hereunder.

Governing Law. This agreement shall be governed by the laws of the State of California.

No Waiver. The failure by either party at any time to require performance or compliance by the other of any of its obligations or agreements shall in no way affect the right to require such performance or compliance at any time thereafter. An express written waiver by either party of a breach of any provision hereof shall not be taken or held to be a waiver of any preceding or succeeding breach of such provision or as a waiver of the provision itself. No waiver of any kind shall be effective or binding, unless it is in writing and is signed by the party against whom such waiver is sought to be enforced.

Severability. Should any provision contained in this letter be held as invalid, illegal or unenforceable, such holding shall not affect the validity of the remainder of this letter, the balance of which shall continue to be binding upon the parties with any such modification to become a part hereof and treated as though originally set forth herein.

Entire Agreement. This letter, along with the Confidentiality Agreement, sets forth the terms of your employment with the Company and supersedes any prior representations or agreements including, but not limited to, any representations made during your recruitment, interviews or pre-employment negotiations, whether written or oral. In the event of any conflicts, ambiguities, or differences between the terms of this agreement any other agreement, the terms and conditions of this Agreement shall control. This letter, including, but not limited to, its at-will employment provision, may not be modified or amended except by a written agreement signed by you and the Company's co-Chairperson of the Board.

* * * *

Sincerely,

/s/ David Schaffer

David Schaffer

Title: Co-Chairperson of the Board

Agreed to and accepted:

Signature: /s/ David Kim
David Kim

Date: March 20, 2015

Signature Page to Offer Letter

4D Molecular Therapeutics, Inc.**Employment Agreement**

This Employment Agreement (this "Agreement"), dated as of January 15, 2019, is made by and between 4D Molecular Therapeutics, Inc., a Delaware corporation (together with any successor thereto, the "Company"), and Peter Francis, M.D. ("Executive") (collectively referred to as the "Parties" or individually referred to as a "Party").

WHEREAS, Executive is currently employed by the Company as its Senior Vice President, Clinical Translational R&D Program Leader, Retina Therapeutic Area, and the Company shall promote Executive as of the Effective Date (as defined below) to its Chief Medical Officer on the terms and conditions provided hereunder and upon Executive's execution of this Agreement, the Prior Agreement (as defined below) shall be superseded and no longer of any force or effect;

WHEREAS, it is the desire of the Company to assure itself of the continued services of the Executive following the Effective Date and thereafter on the terms herein provided by entering into this Agreement; and

WHEREAS, it is the desire of Executive to provide continued services to the Company following the Effective Date and thereafter on the terms herein provided.

NOW, THEREFORE, in consideration of the foregoing, and for other good and valuable consideration, including the respective covenants and agreements set forth below, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto agree as follows:

1. Employment.

(a) General. Effective as of January 15, 2019 (the "Effective Date"), the Company shall employ Executive and Executive shall remain in the employ of the Company, for the period and in the positions set forth in this Section 1, and subject to the other terms and conditions herein.

(b) Employment Term. The term of this Agreement (the "Term") shall commence on the Effective Date and end on the date this Agreement is terminated under Section 3 below.

(c) Positions. Executive shall serve as the Chief Medical Officer of the Company with such responsibilities, duties and authority normally associated with such position and as may from time to time be reasonably assigned to Executive by the Company. Executive shall report directly to the Company's Chief Executive Officer. At the Company's request, Executive shall serve the Company and/or its subsidiaries and affiliates in such other capacities in addition to the foregoing as the Company shall designate, provided that such additional capacities are consistent with Executive's position as the Company's Chief Medical Officer. If Executive serves in any one or more of such additional capacities, Executive's compensation shall not automatically be increased on account of such additional service.

(d) Duties. Executive shall devote substantially all of Executive's working time, attention and efforts to the business and affairs of the Company (which shall include service to its affiliates), except during any paid vacation or other excused absence periods. Executive shall not engage in outside business activities (including serving on outside boards or committees) without the prior written consent of the Board, as defined below (which shall not be unreasonably withheld); *provided* that Executive shall be permitted to (i) manage Executive's personal, financial and legal affairs, (ii) participate in trade

associations and charitable and community affairs, (iii) continue to serve on the board of directors or advisory boards of the companies/organizations set forth on **Exhibit A** attached hereto, if any, and (iv) provide not more than one day per week of clinical ophthalmology services in Oregon, in each case, subject to compliance with this Agreement and provided that such activities do not materially interfere with Executive's performance of Executive's duties and responsibilities hereunder or violate the terms of that certain Confidential Information and Invention Assignment Agreement previously entered into by and between Executive and the Company (the "Confidentiality Agreement"). Executive agrees to observe and comply with the rules and policies of the Company as adopted by the Company from time to time, in each case as amended from time to time, as set forth in writing, and as delivered or made available to Executive (each, a "Policy").

(e) Location. The Company acknowledges that Executive resides in Portland, Oregon; however, the parties agree that to the extent feasible, Executive shall perform his/her duties hereunder at the offices of the Company located in Emeryville, California. In addition, the parties agree that from time to time Executive may be required to travel to other locations in the proper conduct of Executive's responsibilities under this Agreement.

2. **Compensation and Related Matters.**

(a) Annual Base Salary. During the Term and effective as of the Effective Date, Executive shall receive a base salary at a rate of \$325,000 per annum, which shall be paid in accordance with the customary payroll practices of the Company and shall be pro-rated for partial years of employment. Such annual base salary shall be reviewed from time to time by the Board (such annual base salary, as it may be adjusted from time to time, the "Annual Base Salary").

(b) Annual Bonus. During the Term and commencing for the full calendar year 2019, Executive will be eligible to participate in such annual incentive program established by the Board. Executive's annual incentive compensation under such incentive program (the "Annual Bonus") shall be targeted at thirty five percent (35%) of Executive's Annual Base Salary (the "Target Bonus"). The Annual Bonus payable under the incentive program shall be based on the achievement of performance goals to be determined by the Board. The payment of any Annual Bonus pursuant to the incentive program will be made on or before March 15th of the year following the year in which such Annual Bonus is earned.

(c) Benefits. During the Term, Executive shall be eligible to participate in employee benefit plans, programs and arrangements as the Company may from time to time offer to provide to its executives, consistent with the terms thereof and as such plans, programs and arrangements may be amended from time to time. Notwithstanding the foregoing, nothing herein is intended, or shall be construed, to require the Company to institute or continue any, or any particular, plan or benefit. In no event shall Executive be eligible to participate in any severance plan or program of the Company, except as set forth in Section 4 below. In no event shall Executive be eligible to participate in any severance plan or program of the Company, except as set forth in Section 4 below,

(d) Vacation; Holidays. During the Term, Executive shall be entitled to paid vacation per calendar year (pro-rated for partial years) in accordance with the Policies. Any vacation shall be taken at the reasonable and mutual convenience of the Company and Executive. In addition, the Company offers employees time off for standard Company holidays in accordance with the Policies.

(e) **Business Expenses.** During the Term, the Company shall reimburse Executive for all reasonable travel and other business expenses incurred by Executive in the performance of Executive's duties to the Company in accordance with the Company's expense reimbursement Policy, including reasonable airfare between the Bay Area and Portland and reasonable lodging and dinner expenses while working from the Company's Emeryville offices.

(f) **Equity Awards.**

(i) **Promotion Option.** As soon as reasonably practicable following the Effective Date, Executive shall be granted, subject to approval by the Board, an option to purchase 146,680 shares of the Company's common stock (the "**Option**"), with an exercise price per share equal to the fair market value of a share of the Company's common stock on the date of grant (as determined by the Board in its sole discretion), *provided* that Executive is employed by the Company on the date of grant. The Option shall vest and become exercisable as to 1/48th of the shares subject to the Option on each monthly anniversary of the Effective Date, or if no such date exists, on the last day of calendar month, (each such date, a "**Vesting Date**") such that the Option will be fully vested and exercisable on the fourth anniversary of the Effective Date, subject to Executive's continued service with the Company through the applicable Vesting Date.

(ii) **Previous Equity Awards.** Executive's existing equity awards shall continue in accordance with their current terms and conditions.

(iii) **Generally.** The Option and Executive's existing equity awards, and any shares acquired upon exercise, will be subject to the terms and conditions of the Company's equity incentive plan and award agreements to be entered into between Executive and the Company. Executive's equity awards, including the Option, shall also have the accelerated vesting as provided in Section 4 below.

3. Termination.

(a) **At-Will Employment.** The Company and Executive acknowledge that Executive's employment is and shall continue to be "at-will," as defined under applicable law. This means that it is not for any specified period of time and can be terminated by Executive or by the Company at any time, with or without advance notice, and for any or no particular reason or cause. It also means that Executive's job duties, title, and responsibility and reporting level, work schedule, compensation, and benefits, as well as the Company's personnel policies and procedures, may be changed with prospective effect, with or without notice, at any time in the sole discretion of the Company (subject to any ramification such changes may have under Section 4 below). This "at-will" nature of Executive's employment shall remain unchanged during Executive's tenure as an employee and may not be changed, except in an express writing signed by Executive and a duly-authorized representative of the Company. If Executive's employment terminates for any lawful reason, Executive shall not be entitled to any payments, benefits, damages, award, or compensation other than as provided in this Agreement.

(b) **Circumstances.** Executive's employment hereunder may be terminated by the Company or Executive, as applicable, without any breach of this Agreement under the following circumstances:

(i) **Death.** Executive's employment hereunder shall terminate upon Executive's death.

(ii) **Disability.** If Executive has incurred a Disability, as defined below, the Company may terminate Executive's employment.

(iii) *Termination for Cause*. The Company may terminate Executive's employment for Cause, as defined below.

(iv) *Termination without Cause*. The Company may terminate Executive's employment without Cause.

(v) *Resignation from the Company with Good Reason*. Executive may resign Executive's employment with the Company with Good Reason, as defined below.

(vi) *Resignation from the Company without Good Reason*. Executive may resign Executive's employment with the Company for any reason other than Good Reason or for no reason.

(c) **Notice of Termination**. During the Term, any termination of Executive's employment by the Company or by Executive under this Section 3 (other than termination pursuant to Section 3(a)(i) above) shall be communicated by a written notice (a "**Notice of Termination**") to the other Party hereto (i) indicating the specific termination provision in this Agreement relied upon, (ii) setting forth in reasonable detail the facts and circumstances claimed to provide a basis for termination of Executive's employment under the provision so indicated, if applicable, and (iii) specifying a Date of Termination (as defined below). The failure by either party to set forth in the Notice of Termination any fact or circumstance shall not waive any right of the party hereunder or preclude the party from asserting such fact or circumstance in enforcing the party's rights hereunder.

(d) **Termination Date**. For purposes of this Agreement, "**Date of Termination**" shall mean the date of the termination of Executive's employment with the Company, which, if Executive's employment is terminated as a result of Executive's death, will be the date of Executive's death, and otherwise shall be the date specified in a Notice of Termination.

(e) **Deemed Resignation**. Upon termination of Executive's employment for any reason, Executive shall be deemed to have resigned from all offices and directorships, if any, then held with the Company or any of its subsidiaries.

4. Obligations upon a Termination of Employment.

(a) **Company Obligations upon Termination**. Upon termination of Executive's employment pursuant to any of the circumstances listed in Section 3(b) above, Executive (or Executive's estate) shall be entitled to receive the sum of: (i) the portion of Executive's Annual Base Salary earned through the Date of Termination, but not yet paid to Executive; (ii) any accrued but unpaid paid vacation owed to Executive pursuant to Section 2(d) above, if applicable; (iii) any expenses owed to Executive pursuant to Section 2(e) above; and (iv) any amount accrued and arising from Executive's participation in, or benefits accrued under any employee benefit plans, programs or arrangements, which amounts shall be payable in accordance with the terms and conditions of such employee benefit plans, programs or arrangements (collectively, the "**Company Arrangements**"). Except as otherwise expressly required by law or as specifically provided in a Company Arrangement or herein, all of Executive's rights to salary, severance, benefits, bonuses and other compensatory amounts hereunder (if any) shall cease upon the termination of Executive's employment hereunder.

(b) Executive's Obligations upon Termination.

(i) *Cooperation.* Executive shall provide Executive's reasonable cooperation in connection with any action or proceeding (or any appeal from any action or proceeding) which relates to events occurring during Executive's employment hereunder; *provided* the Company shall indemnify and hold harmless Executive with respect to any such cooperation and reimburse Executive for Executive's reasonable costs and expenses (including legal counsel selected by Executive and reasonably acceptable to the Company) and such cooperation shall not unreasonably burden Executive or unreasonably interfere with any subsequent employment that Executive may undertake.

(ii) *Return of Company Property.* Executive hereby acknowledges and agrees that all Personal Property (as defined below) and equipment furnished to, or prepared by, Executive in the course of, or incident to, Executive's employment, belongs to the Company and shall be promptly returned to the Company upon termination of Executive's employment (and will not be kept in Executive's possession or delivered to anyone else). For purposes of this Agreement, "Personal Property" includes, without limitation, all books, manuals, records, reports, notes, contracts, lists, blueprints, and other documents, or materials, or copies thereof (including computer files), keys, building card keys, company credit cards, telephone calling cards, computer hardware and software, laptop computers, docking stations, cellular and portable telephone equipment, personal digital assistant (PDA) devices and all other proprietary information relating to the business of the Company or its subsidiaries or affiliates. Following termination, Executive shall not retain any written or other tangible material containing any proprietary information of the Company or its subsidiaries or affiliates.

(c) Severance Payments upon a Termination without Cause or Resignation with Good Reason. If, during the Term (whether before or after a Change in Control), Executive's employment terminates pursuant to Section 3(a)(iv) above due to the Company's termination without Cause or pursuant to Section 3(a)(v) above due to Executive's resignation with Good Reason, then, subject to Executive's delivery to the Company of an executed waiver and release of claims in a form approved by the Company (the "Release") that becomes effective and irrevocable in accordance with Section 9(m)(vi) below, and Executive's continued compliance with Section 5 below, Executive shall receive, in addition to payments and benefits set forth in Section 4(a) above, the following:

(i) an amount in cash equal to nine (9) months of Executive's then-existing Annual Base Salary, payable, less applicable withholdings and deductions, in a single lump sum cash payment on the first regular payroll date following the date the Release becomes effective and irrevocable or as otherwise provided in Section 9(m)(vi) below; and

(ii) during the period commencing on the Date of Termination and ending on the nine (9) month anniversary thereof or, if earlier, the date on which Executive becomes eligible for comparable replacement coverage under a subsequent employer's group health plan (in any case, the "COBRA Period"), subject to Executive's valid election to continue healthcare coverage under Section 4980B of the Code and the regulations thereunder, the Company shall, in its sole discretion, either (A) continue to provide to Executive and Executive's dependents, at the Company's sole expense, or (B) reimburse Executive and Executive's dependents for coverage under its group health plan (if any), at the same levels and costs in effect on the Date of Termination (excluding, for purposes of calculating cost, an employee's ability to pay premiums with pre-tax dollars); *provided, however*, that if (1) any plan pursuant to which such benefits are provided is not, or ceases prior to the expiration of the continuation coverage period to be, exempt from the application of Section 409A under Treasury Regulation Section 1.409A-1(a)(5), (2) the Company is otherwise unable to continue to cover Executive or Executive's dependents under its

group health plans or (3) the Company cannot provide the benefit without violating applicable law (including, without limitation, Section 2716 of the Public Health Service Act), then, in any such case, an amount equal to each remaining Company subsidy shall thereafter be paid to Executive in substantially equal monthly installments over the COBRA Period (or remaining portion thereof).

(d) Change in Control. Notwithstanding anything herein to the contrary, in the event of a Change in Control during the Term, the vesting and, if applicable, exercisability of Executive's then outstanding and unvested equity awards shall accelerate (and, if applicable, all restrictions and rights of repurchase on such awards shall lapse) as of immediately prior to such a Change in Control in respect of one hundred percent (100%) of the then-unvested shares of Company common stock subject thereto (excluding any such awards that vest in whole or in part based on the attainment of performance-vesting conditions, which shall be governed by the terms of the applicable award agreement).

(e) No Requirement to Mitigate; Survival. Executive shall not be required to mitigate the amount of any payment provided for under this Agreement by seeking other employment or in any other manner. Notwithstanding anything to the contrary in this Agreement, the termination of Executive's employment shall not impair the rights or obligations of any Party.

(f) Certain Reductions. The Company shall reduce Executive's severance benefits under this Agreement, in whole or in part, by any other severance benefits, pay in lieu of notice, or other similar benefits payable to Executive by the Company in connection with Executive's termination, including but not limited to, payments or benefits pursuant to (i) any applicable legal requirement, including, without limitation, the Worker Adjustment and Retraining Notification Act, or (ii) any Company policy or practice providing for Executive to remain on the payroll without being in active service for a limited period of time after being given notice of the termination of Executive's employment. The benefits provided under this Agreement are intended to satisfy, to the greatest extent possible, any and all statutory obligations that may arise out of Executive's termination of employment. Such reductions shall be applied on a retroactive basis, with severance benefits previously paid being recharacterized as payments pursuant to the Company's statutory obligation.

(g) Survival. Notwithstanding anything to the contrary in this Agreement, the provisions of Sections 5 through 9 of this Agreement will survive the termination of Executive's employment and the termination of the Term.

5. Restrictive Covenants and Confidentiality.

Executive will continue to abide by and be subject to the terms and conditions of the Confidentiality Agreement, which is hereby incorporated by reference into this Agreement. Executive acknowledges that the provisions of the Confidentiality Agreement will survive the termination of Executive's employment and the termination of the Term for the periods set forth in the Confidentiality Agreement.

6. Assignment and Successors.

The Company may assign its rights and obligations under this Agreement to any of its affiliates or to any successor to all or substantially all of the business or the assets of the Company (by merger or otherwise). This Agreement shall be binding upon and inure to the benefit of the Company, Executive and their respective successors, assigns, personnel and legal representatives, executors, administrators, heirs, distributees, devisees, and legatees, as applicable. None of Executive's rights or obligations may be

assigned or transferred by Executive, other than Executive's rights to payments hereunder, which may be transferred only by will or operation of law. Notwithstanding the foregoing, Executive shall be entitled, to the extent permitted under applicable law and applicable Company Arrangements, to select and change a beneficiary or beneficiaries to receive compensation hereunder following Executive's death by giving written notice thereof to the Company.

7. **Certain Definitions.**

(a) **Board.** The "**Board**" shall mean the Board of Directors of the Company or an authorized committee of the Board.

(a) **Cause.** "**Cause**" shall mean (i) Executive's material failure to perform Executive's principal assigned duties or responsibilities as a Service Provider (as defined in the Company's 2015 Equity Incentive Plan) (other than a failure resulting from Executive's Disability) *provided*, that, the failure of Executive to achieve certain results, such as the Company's business plan, in and of itself, would not constitute "Cause"; (ii) Executive's engaging in any act of dishonesty, fraud or material misrepresentation; (iii) Executive's violation of any federal or state law or regulation applicable to the business of the Company or its affiliates which results in or could reasonably be expected to result in harm or creates material risk to the Company, as determined by the Board; (iv) Executive's breach of the Confidentiality Agreement, any other confidentiality agreement or invention assignment agreement, or any other material contract between Executive and the Company (or any affiliate of the Company) or violation of any of the written policies of the Company (or any affiliate of the Company); or (v) Executive's being convicted of, or entering a plea of *nolo contendere* to, any crime or committing any act of moral turpitude. The Company shall not terminate Executive for Cause pursuant to clause "(i)" above without first providing Executive with written notice of the acts or omissions constituting the grounds for such termination and if in the reasonable judgment of the Company such failure may be cured within thirty (30) days, expiration of a reasonable cure period not to exceed thirty (30) days following the date of such notice.

(b) **Change in Control.** "**Change in Control**" shall have the meaning set forth in the version of the Company's 2015 Equity Incentive Plan in effect on the Effective Date. Notwithstanding the foregoing, a "**Change in Control**" must also constitute a "change in control event," as defined in Treasury Regulation §1.409A-3(i)(5).

(c) **Code.** "**Code**" shall mean the Internal Revenue Code of 1986, as amended, and the regulations and guidance promulgated thereunder.

(d) **Disability.** "**Disability**" shall mean a permanent and total disability within the meaning of Section 22(e)(3) of the Code, as it may be amended from time to time.

(e) **Good Reason.** For the sole purpose of determining Executive's right to severance payments and benefits as described above, "**Good Reason**" shall mean Executive's voluntary termination of Executive's employment following the occurrence of one or more of the following, without Executive's express written consent and the failure of the Company to cure such Good Reason, all pursuant to this paragraph:

(i) the Company's offices move more than fifty (50) miles away from their current location;

(ii) any material and adverse change including any material diminution in Executive's title, duties, authority or responsibilities, but excluding changes in Executive's title, duties, authority, responsibilities, and reporting relationships in the event of a Change in Control; *provided* Executive's remaining duties and responsibilities are consistent with industry norms for the title at companies, subsidiaries or divisions of similar size and circumstances;

(iii) the assignment to Executive of duties materially inconsistent with Executive's position with the Company;

(iv) a reduction in Executive's Annual Base Salary or Target Bonus other than pursuant to a reduction in compensation that applies to all executive and senior officers; and

(v) any material breach by the Company of this Agreement.

The Board will be given not less than thirty (30) days' written notice by Executive (within twenty (20) days of the occurrence of the event constituting Good Reason) of Executive's intention to terminate Executive's employment for Good Reason, such notice to state in detail the particular act or acts or failure or failures to act that constitute the grounds on which the proposed termination for Good Reason is based and proposed actions to provide a sufficient cure of such act or acts, or failure or failures to act, and such termination shall be effective at the expiration of such notice period only if the Company has not materially cured such act or acts or failure or failures to act that give rise to Good Reason during such period. Notwithstanding the foregoing, the Company in its sole election may waive any cure periods and Executive's termination will be effective on such earlier date determined by the Board.

8. Parachute Payments.

(a) Notwithstanding any other provisions of this Agreement or any Company Arrangement, in the event that any payment or benefit by the Company or otherwise to or for the benefit of Executive, whether paid or payable or distributed or distributable pursuant to the terms of this Agreement or otherwise (all such payments and benefits, including the payments and benefits under Section 4 above, being hereinafter referred to as the "Total Payments"), would be subject (in whole or in part) to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then the Total Payments shall be reduced (in the order provided in Section 8(b) below) to the minimum extent necessary to avoid the imposition of the Excise Tax on the Total Payments, but only if (i) the net amount of such Total Payments, as so reduced (and after subtracting the net amount of federal, state and local income and employment taxes on such reduced Total Payments and after taking into account the phase out of itemized deductions and personal exemptions attributable to such reduced Total Payments), is greater than or equal to (ii) the net amount of such Total Payments without such reduction (but after subtracting the net amount of federal, state and local income and employment taxes on such Total Payments and the amount of the Excise Tax to which Executive would be subject in respect of such unreduced Total Payments and after taking into account the phase out of itemized deductions and personal exemptions attributable to such unreduced Total Payments).

(b) The Total Payments shall be reduced in the following order: (i) reduction on a pro-rata basis of any cash severance payments that are exempt from Section 409A of the Code ("Section 409A"), (ii) reduction on a pro-rata basis of any non-cash severance payments or benefits that are exempt from Section 409A, (iii) reduction on a pro-rata basis of any other payments or benefits that are exempt from Section 409A, and (iv) reduction of any payments or benefits otherwise payable to Executive on a pro-rata basis or such other manner that complies with Section 409A; *provided*, in case of subclauses (ii), (iii) and (iv), that reduction of any payments attributable to the acceleration of vesting of Company equity awards shall be first applied to Company equity awards that would otherwise vest last in time.

(c) The Company will select an adviser with experience in performing calculations regarding the applicability of Section 280G of the Code and the Excise Tax, *provided* that the adviser's determination shall be made based upon "substantial authority" within the meaning of Section 6662 of the Code, (the "Adviser") to make determinations regarding the application of this Section 8. The Adviser shall provide its determination, together with detailed supporting calculations and documentation, to Executive and the Company within fifteen (15) business days following the date on which Executive's right to the Total Payments is triggered, if applicable, or such other time as requested by Executive (*provided*, that Executive reasonably believes that any of the Total Payments may be subject to the Excise Tax) or the Company. The costs of obtaining such determination and all related fees and expenses (including related fees and expenses incurred in any later audit) shall be borne by the Company. Any good faith determinations of the Adviser made hereunder shall be final, binding and conclusive upon the Company and Executive.

(d) In the event it is later determined that to implement the objective and intent of this Section 8, (i) a greater reduction in the Total Payments should have been made, the excess amount shall be returned promptly by Executive to the Company or (ii) a lesser reduction in the Total Payments should have been made, the excess amount shall be paid or provided promptly by the Company to Executive, except to the extent the Company reasonably determines would result in imposition of an excise tax under Section 409A.

9. Miscellaneous Provisions.

(a) Governing Law. This Agreement shall be governed, construed, interpreted and enforced in accordance with its express terms, and otherwise in accordance with the substantive laws of the State of California without reference to the principles of conflicts of law of the State of California or any other jurisdiction that would result in application of the laws of a jurisdiction other than the State of California, and where applicable, the laws of the United States.

(b) Validity. The invalidity or unenforceability of any provision or provisions of this Agreement shall not affect the validity or enforceability of any other provision of this Agreement, which shall remain in full force and effect.

(c) Notices. Any notice, request, claim, demand, document and other communication hereunder to any Party shall be effective upon receipt (or refusal of receipt) and shall be in writing and delivered personally or sent by facsimile or certified or registered mail, postage prepaid, as follows:

- (i) If to the Company, to the Board at the Company's headquarters,
- (ii) If to Executive, to the last address that the Company has in its personnel records for Executive, or
- (iii) At any other address as any Party shall have specified by notice in writing to the other Party.

(d) Counterparts. This Agreement may be executed in several counterparts, each of which shall be deemed to be an original, but all of which together will constitute one and the same Agreement. Signatures delivered by facsimile or PDF shall be deemed effective for all purposes.

(e) Entire Agreement. The terms of this Agreement, the Confidentiality Agreement, any indemnification agreement between the Company and Executive and any equity award agreement between the Company and Executive are intended by the Parties to be the final expression of their agreement with respect to the subject matter hereof and supersede all prior understandings and agreements, whether written or oral, including without limitation that certain prior offer letter between Executive and the Company dated as of July 28, 2016 (the "Prior Agreement"); *provided* that the equity acceleration provisions in this Agreement shall supersede the provisions of any equity award agreement between the Company and Executive. The Parties further intend that this Agreement shall constitute the complete and exclusive statement of their terms and that no extrinsic evidence whatsoever may be introduced in any judicial, administrative, or other legal proceeding to vary the terms of this Agreement.

(f) Amendments; Waivers. This Agreement may not be modified, amended, or terminated except by an instrument in writing, signed by Executive and a duly authorized representative of Company. By an instrument in writing similarly executed, Executive or a duly authorized representative of the Company may waive compliance by the other Party with any specifically identified provision of this Agreement that such other Party was or is obligated to comply with or perform; *provided, however*, that such waiver shall not operate as a waiver of, or estoppel with respect to, any other or subsequent failure. No failure to exercise and no delay in exercising any right, remedy, or power hereunder preclude any other or further exercise of any other right, remedy, or power provided herein or by law or in equity.

(g) No Inconsistent Actions. The Parties hereto shall not voluntarily undertake or fail to undertake any action or course of action inconsistent with the provisions or essential intent of this Agreement. Furthermore, it is the intent of the Parties hereto to act in a fair and reasonable manner with respect to the interpretation and application of the provisions of this Agreement.

(h) Construction. This Agreement shall be deemed drafted equally by both the Parties. Its language shall be construed as a whole and according to its fair meaning. Any presumption or principle that the language is to be construed against any Party shall not apply. The headings in this Agreement are only for convenience and are not intended to affect construction or interpretation. Any references to paragraphs, subparagraphs, sections or subsections are to those parts of this Agreement, unless the context clearly indicates to the contrary. Also, unless the context clearly indicates to the contrary, (i) the plural includes the singular and the singular includes the plural; (ii) "and" and "or" are each used both conjunctively and disjunctively; (iii) "any," "all," "each," or "every" means "any and all," and "each and every"; (iv) "includes" and "including" are each "without limitation"; (v) "herein," "hereof," "hereunder" and other similar compounds of the word "here" refer to the entire Agreement and not to any particular paragraph, subparagraph, section or subsection; and (vi) all pronouns and any variations thereof shall be deemed to refer to the masculine, feminine, neuter, singular or plural as the identity of the entities or persons referred to may require.

(i) Arbitration. Any controversy, claim or dispute arising out of or relating to this Agreement, shall be settled solely and exclusively by a binding arbitration process administered by JAMS/Endispute in Alameda County, California. Such arbitration shall be conducted in accordance with the then-existing JAMS/Endispute Rules of Practice and Procedure, before a sole arbitrator pursuant to its Streamlined Arbitration Rules and Procedures. The rules can be found at <https://www.jamsadr.com/rules-employment-arbitration/>, or a copy will be provided upon request. The arbitrator shall: (i) provide adequate discovery for the resolution of the dispute; and (ii) issue a written arbitration decision, to include the arbitrator's essential findings and conclusions and a statement of the award. Except to the extent of filing fees Executive would incur were the matter to be litigated in court, the Company shall be responsible for the JAMS/Endispute administrative fees and the arbitrator's fees and costs. The arbitrator shall award the prevailing Party attorneys' fees and expert fees, if any. The Parties agree to abide by all

decisions and awards rendered in such proceedings. Such decisions and awards rendered by the arbitrator shall be final and conclusive. All such controversies, claims or disputes shall be settled in this manner in lieu of any action at law or equity; *provided, however*, that nothing in this subsection shall be construed as precluding the bringing of an action for injunctive relief or specific performance as provided in this Agreement or the Confidentiality Agreement. This dispute resolution process and any arbitration hereunder shall be confidential and neither any Party nor the neutral arbitrator shall disclose the existence, contents or results of such process without the prior written consent of all Parties, except where necessary or compelled in a court to enforce this arbitration provision or an award from such arbitration or otherwise in a legal proceeding. If JAMS/Endispute no longer exists or is otherwise unavailable, the Parties agree that the American Arbitration Association (“AAA”) shall administer the arbitration in accordance with its then-existing rules as modified by this subsection. In such event, all references herein to JAMS/Endispute shall mean AAA. Executive and the Company understand that by agreement to arbitrate any claim pursuant to this Section 9(i), they will not have the right to have any claim decided by a jury or a court, but shall instead have any claim decided through arbitration. Executive and the Company waive any constitutional or other right to bring claims covered by this Agreement other than in their individual capacities. Except as may be prohibited by applicable law, the foregoing waiver includes the ability to assert claims as a plaintiff or class member in any purported class or representative proceeding. Notwithstanding the foregoing, Executive and the Company each have the right to resolve any issue or dispute over intellectual property rights by court action instead of arbitration.

(j) **Enforcement.** If any provision of this Agreement is held to be illegal, invalid or unenforceable under present or future laws effective during the Term, such provision shall be fully severable; this Agreement shall be construed and enforced as if such illegal, invalid or unenforceable provision had never comprised a portion of this Agreement; and the remaining provisions of this Agreement shall remain in full force and effect and shall not be affected by the illegal, invalid or unenforceable provision or by its severance from this Agreement. Furthermore, in lieu of such illegal, invalid or unenforceable provision there shall be added automatically as part of this Agreement a provision as similar in terms to such illegal, invalid or unenforceable provision as may be possible and be legal, valid and enforceable.

(k) **Withholding.** The Company shall be entitled to withhold from any amounts payable under this Agreement any federal, state, local or foreign withholding or other taxes or charges that the Company is required to withhold. The Company shall be entitled to rely on an opinion of counsel if any questions as to the amount or requirement of withholding shall arise.

(l) **Whistleblower Protections and Trade Secrets.** Notwithstanding anything to the contrary contained herein, nothing in this Agreement prohibits Executive from reporting possible violations of federal law or regulation to any United States governmental agency or entity in accordance with the provisions of and rules promulgated under Section 21F of the Securities Exchange Act of 1934 or Section 806 of the Sarbanes-Oxley Act of 2002, or any other whistleblower protection provisions of state or federal law or regulation (including the right to receive an award for information provided to any such government agencies). Furthermore, in accordance with 18 U.S.C. § 1833, notwithstanding anything to the contrary in this Agreement: (i) Executive shall not be in breach of this Agreement, and shall not be held criminally or civilly liable under any federal or state trade secret law (A) for the disclosure of a trade secret that is made in confidence to a federal, state, or local government official or to an attorney solely for the purpose of reporting or investigating a suspected violation of law, or (B) for the disclosure of a trade secret that is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal; and (ii) if Executive files a lawsuit for retaliation by the Company for reporting a suspected violation of law, Executive may disclose the trade secret to Executive’s attorney, and may use the trade secret information in the court proceeding, if Executive files any document containing the trade secret under seal, and does not disclose the trade secret, except pursuant to court order.

(m) Section 409A.

(i) *General.* The intent of the Parties is that the payments and benefits under this Agreement comply with or be exempt from Section 409A and, accordingly, to the maximum extent permitted, this Agreement shall be interpreted to be in compliance therewith. Except as otherwise permitted under Section 409A, no payment hereunder shall be accelerated or deferred unless such acceleration or deferral would not result in additional tax or interest pursuant to Section 409A.

(ii) *Separation from Service.* Notwithstanding anything in this Agreement to the contrary, any compensation or benefits payable under this Agreement that is considered nonqualified deferred compensation under Section 409A and is designated under this Agreement as payable upon Executive's termination of employment shall be payable only upon Executive's "separation from service" with the Company within the meaning of Section 409A (a "Separation from Service").

(iii) *Specified Employee.* Notwithstanding anything in this Agreement to the contrary, if Executive is deemed by the Company at the time of Executive's Separation from Service to be a "specified employee" for purposes of Section 409A, to the extent delayed commencement of any portion of the benefits to which Executive is entitled under this Agreement is required in order to avoid a prohibited distribution under Section 409A, such portion of Executive's benefits shall not be provided to Executive prior to the earlier of (A) the expiration of the six (6)-month period measured from the date of Executive's Separation from Service with the Company or (B) the date of Executive's death. Upon the first business day following the expiration of the applicable Section 409A period, all payments deferred pursuant to the preceding sentence shall be paid in a lump sum to Executive (or Executive's estate or beneficiaries), and any remaining payments due to Executive under this Agreement shall be paid as otherwise provided herein.

(iv) *Expense Reimbursements.* To the extent that any reimbursements under this Agreement are subject to Section 409A, any such reimbursements payable to Executive shall be paid to Executive no later than December 31st of the year following the year in which the expense was incurred; *provided*, that Executive submits Executive's reimbursement request promptly following the date the expense is incurred, the amount of expenses reimbursed in one year shall not affect the amount eligible for reimbursement in any subsequent year, other than medical expenses referred to in Section 105(b) of the Code, and Executive's right to reimbursement under this Agreement will not be subject to liquidation or exchange for another benefit.

(v) *Installments.* Executive's right to receive any installment payments under this Agreement, including without limitation any continuation salary payments that are payable on Company payroll dates, shall be treated as a right to receive a series of separate payments and, accordingly, each such installment payment shall at all times be considered a separate and distinct payment as permitted under Section 409A.

(vi) *Release*. Notwithstanding anything to the contrary in this Agreement, to the extent that any payments due under this Agreement as a result of Executive's termination of employment are subject to Executive's execution and delivery of a Release, (A) the Company shall deliver the Release to Executive within ten (10) business days following Executive's Date of Termination, and the Company's failure to deliver a Release prior to the expiration of such ten (10) business day period shall constitute a waiver of any requirement to execute a Release, (B) if Executive fails to execute the Release on or prior to the Release Expiration Date (as defined below) or timely revokes Executive's acceptance of the Release thereafter, Executive shall not be entitled to any payments or benefits otherwise conditioned on the Release, and (C) in any case where Executive's Date of Termination and the Release Expiration Date fall in two separate taxable years, any payments required to be made to Executive that are conditioned on the Release and are treated as nonqualified deferred compensation for purposes of Section 409A shall be made in the later taxable year. For purposes hereof, "Release Expiration Date" shall mean (1) if Executive is under 40 years old as of the Date of Termination, the date that is seven (7) days following the date upon which the Company timely delivers the Release to Executive, or such shorter time prescribed by the Company, and (2) if Executive is 40 years or older as of the Date of Termination, the date that is twenty-one (21) days following the date upon which the Company timely delivers the Release to Executive, or, in the event that Executive's termination of employment is "in connection with an exit incentive or other employment termination program" (as such phrase is defined in the Age Discrimination in Employment Act of 1967), the date that is forty-five (45) days following such delivery date. To the extent that any payments of nonqualified deferred compensation (within the meaning of Section 409A) due under this Agreement as a result of Executive's termination of employment are delayed pursuant to this Section 9(m)(vi), such amounts shall be paid in a lump sum on the first payroll date following the date that Executive executes and does not revoke the Release (and the applicable revocation period has expired) or, in the case of any payments subject to Section 9(m)(vi)(C), on the first payroll period to occur in the subsequent taxable year, if later.

10. Prior Employment.

Executive represents and warrants that the performance of Executive's duties hereunder will not breach any duty owed by Executive to any prior employer or other person. Executive further represents and warrants to the Company that (a) the performance of Executive's obligations hereunder will not violate any agreement between Executive and any other person, firm, organization, or other entity; (b) Executive is not bound by the terms of any agreement with any previous employer or other party to refrain from competing, directly or indirectly, with the business of such previous employer or other party that would be violated by Executive entering into this Agreement and/or providing services to the Company pursuant to the terms of this Agreement; and (c) Executive's performance of Executive's duties under this Agreement will not require Executive to, and Executive shall not, rely on in the performance of Executive's duties or disclose to the Company or any other person or entity or induce the Company in any way to use or rely on any trade secret or other confidential or proprietary information or material belonging to any previous employer of Executive.

11. Executive Acknowledgement.

Executive acknowledges that Executive has read and understands this Agreement, is fully aware of its legal effect, has not acted in reliance upon any representations or promises made by the Company other than those contained in writing herein, and has entered into this Agreement freely based on Executive's own judgment.

[Signature Page Follows]

IN WITNESS WHEREOF, the Parties have executed this Agreement on the date and year first above written.

4D MOLECULAR THERAPEUTICS, INC.

By: /s/ David Kim

Name: David Kim

Title: CEO

EXECUTIVE

/s/ Peter Francis

Peter Francis, M.D.

[Signature Page to Employment Agreement]

EXHIBIT A

CURRENT SERVICE

[**Note to Draft:** List any current service by Executive that has been approved by the Company, such as clinical work.]



5980 Horton St. Suite 460
Emeryville, CA 94608
p: (510) 505-2680
f: (510) 217-2400
info@4dmoleculartherapeutics.com

January 4, 2019

August Moretti
[*****]

Dear August:

We are pleased to make you the following offer of employment. We believe you will play an important and meaningful role in our mission of curing people of genetic diseases.

Position. Your title will be Chief Financial Officer. You will be reporting to the CEO, David Kirn. Your employment commencement date will be January 7, 2018 (the actual date you start employment, the “**Start Date**”). Your primary work location will be at 5980 Horton Street, Suite 460, Emeryville, California, at the 4D Molecular Therapeutics, Inc. (together with its successors, the “**Company**”) labs and offices. You agree to devote your full time and best efforts to the performance of your duties to the Company. Notwithstanding the foregoing, you may devote reasonable time to unpaid activities such as supervision of personal investments and activities involving professional, charitable, educational, religious, civic and similar types of activities, speaking engagements and membership on committees, **provided** such activities do not individually or in the aggregate interfere with the performance of your duties under this Agreement, violate the Company’s standards of conduct, or present a conflict of interest. You may serve on the board of directors or advisory boards of private or publicly traded companies (other than the Company’s Board) only with the Board’s prior written consent. This is a full-time exempt position.

Compensation/Benefits. You will receive an annual salary of \$380,000 (USD). You will be paid twice a month less applicable withholdings and deductions in accordance with the Company’s normal payroll practices. You will also be eligible to receive employee benefits (medical, dental and vacation) according to the terms of the applicable Company policy or benefit plan, as in effect or amended from time to time. You should note that, subject to any consequences under this offer letter, the Company may modify job titles, salaries and benefits from time to time as it deems necessary or appropriate and in accordance with applicable laws. In addition, you will be eligible to receive a discretionary annual performance bonus, with a target of up to 35% of your base salary, the amount of which is subject to approval by the Company’s Board of Directors and based on the achievement of certain individual and corporate performance objectives.



Diversity → Directed Evolution → Delivery → Disease Eradication

4dmt.com

Incentive Compensation. In addition, if you decide to join the Company, it will be recommended at the first meeting of the Company's board of directors following the Start Date that the Company grant you an option to purchase shares of Common Stock in the Company at a price per share equal to the fair market value per share of such Common Stock on the date of grant, as determined by the Company's board of directors (the "Option"), which is approximately 225,060 of the Fully Diluted Shares (as defined below). Subject to your continued employment with the Company through the applicable vesting date, 25% of the shares underlying the Option will vest on the first anniversary of the Start Date and 1/48th of the total number of shares initially underlying the Option will vest on each monthly anniversary thereafter. Your grant shall be subject to the terms and conditions of the Company's 2015 Equity Incentive Plan and a Stock Option Agreement entered into with the Company and you, including vesting requirements. No right to any equity is earned or accrued until such time that vesting occurs, nor does the Option confer any right to continue vesting or employment. For purposes hereof, "**Fully Diluted Shares**" shall be calculated by adding the number of outstanding shares of capital stock plus the number of shares subject to issuance under outstanding options or warrants, in each case, as of the close of the business day preceding the date of determination.

Severance Prior To Change In Control. If you are terminated by the Company without Cause (as defined below) or resign for Good Reason (as defined below) outside of a Change of Control or Stock Sale (as defined below), you will be eligible to receive a lump sum payment equal to nine (9) months of your-then current base salary as well as be eligible to receive reimbursement of the COBRA (as defined below) premiums for you and your covered dependents, for up to nine (9) months, subject to required withholdings and deductions, provided in each case that you have signed a general release of claims in favor of the Company in customary form acceptable to the Company (the "Release") and the Release has become effective and irrevocable within 60 days following the date of your termination, and subject to your continued compliance with the CIIAA (as defined below). The cash payment shall be made in a single lump sum within 60 days of your termination date, provided the Release is effective at such time. The Company shall notify you of any right to continue group health plan coverage sponsored by the Company or an affiliate of the Company immediately prior to your termination pursuant to the provisions of the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended ("**COBRA**"), and you must timely elect to receive such continued COBRA coverage. Any COBRA reimbursements shall be paid to you following your submission of your COBRA payments to the applicable plan provider and following 60 days of the scheduled COBRA due date. If you obtain employment during this nine (9) month period that entitles you and your spouse and eligible dependents to comprehensive medical coverage, you must notify the Company, and no further COBRA reimbursements or payment shall be made by the Company to you pursuant to this paragraph.

Severance in Connection with Change In Control or Stock Sale. In the event you are terminated by the Company without Cause or resign for Good Reason, either within one month before a Change in Control or Stock Sale (each, as defined in the Company's 2015 Equity Incentive Plan) or within twelve (12) months after a Change in Control or Stock Sale (such period, the "**Change in Control Period**"), you will be eligible to receive the severance payments and benefits set forth in the paragraph above and the vesting and, if applicable, exercisability of your outstanding equity awards, including, without limitation, the Option, shall accelerate in full effective as of immediately prior to the date of termination, provided in each case that you have signed the Release and the Release has become effective and irrevocable within 60 days following the date of your termination, and subject to your continued compliance with the CIIAA (as defined below).

“Cause”. “Cause” shall mean: (i) your material failure to perform your principal assigned duties or responsibilities as a Service Provider (other than a failure resulting from your Disability (as defined in the Plan)); provided, that, the failure of you to achieve certain results, such as the Company’s business plan, in and of itself, would not constitute “Cause”; (ii) your engaging in any act of dishonesty, fraud or material misrepresentation; (iii) your violation of any federal or state law or regulation applicable to the business of the Company or its affiliates which results in or could reasonably be expected to result in harm or creates material risk to the Company, as determined by the Board of Directors; (iv) your breach of any confidentiality agreement or invention assignment agreement, or your material breach of any other material contract between you and the Company (or any affiliate of the Company) or material violation of any of the written policies of the Company (or any affiliate of the Company); or (v) your being convicted of, or entering a plea of nolo contendere to, any felony or committing any act of moral turpitude; or (vi) your commission of any act or involvement in any situation, or occurrence, which brings you into widespread public disrepute, contempt, scandal or ridicule, or which justifiably shocks, insults or offends a significant portion of the community, or you being subject to publicity for any such conduct or involvement in such conduct. The Company shall not terminate you for Cause pursuant to clause “(i)” above) without first providing you with written notice of the acts or omissions constituting the grounds for such termination and if in the reasonable judgment of the Company such failure may be cured within thirty (30) days, expiration of a reasonable cure period not to exceed thirty (30) days following the date of such notice.

“Good Reason”. For purposes of this letter agreement, “Good Reason” means (i) a material diminution in your base salary except for across-the-board salary reductions similarly affecting all or substantially all similarly situated employees of the Company, (ii) a material diminution in your authority duties or responsibilities, or (iii) a change of more than 50 miles in the geographic location at which you provide services to the Company, provided, however, that in the event of the occurrence of a Good Reason condition listed above you must provide notice to the Company within thirty (30) days of the initial occurrence of such condition and allow the Company thirty (30) days in which to cure such condition. Additionally, in the event the Company fails to cure the condition within the cure period provided, you must terminate employment with the Company within sixty (60) days of the end of the cure period.

No conflicts. By signing below, you agree that there is no lawful reason to prevent you from accepting a position with the Company. We also ask that, if you have not already done so, you disclose to the Company any and all agreements relating to your prior employment that may affect your eligibility to be employed by the Company or limit the manner in which you may be employed by the Company. It is the Company’s understanding that any such agreements will not prevent you from performing the duties of your position with the Company, and you represent that such is the case.

Company Policies. As a Company employee, you will be expected to abide by the Company's rules and policies, which may change from time to time in accordance with applicable laws.

Confidential Information/Nondisclosure/Nonsolicitation of Employees. As a condition of your employment with the Company, you are required to sign the Company's Confidential Information and Invention Assignment Agreement, a copy of which is enclosed (the "**CIIAA**").

At-Will Employment. Your employment is at will, which means that either you or the Company can terminate your employment with the Company at any time with or without notice and with or without cause. Nothing in this letter or the CIIAA shall be construed to alter the at-will nature of your employment relationship with the Company.

Conditions of Employment. The Company reserves the right to conduct background investigations and/or reference checks on all of its potential employees. Your job offer, therefore, is contingent upon a clearance of such a background investigation and/or reference check. You are also required, as a condition of employment, to provide to the Company with the required I-9 documentation evidencing your identity and eligibility for employment in the United States. This documentation must be provided to us within three business days of your first day of employment or your employment may be terminated.

Severability. Should any provision contained in this letter be held as invalid, illegal or unenforceable, such holding shall not affect the validity of the remainder of this letter, the balance of which shall continue to be binding upon the parties with any such modification to become a part hereof and treated as though originally set forth herein.

Acceptance of Offer. To accept the Company's offer of employment, please sign and date this letter in the space provided below and return a scanned copy of this letter and the signed CIIAA to [*****]. Please bring or mail the original to: Lisa Stemmerich, 4D Molecular Therapeutics, 5980 Horton Street, Suite 460, Emeryville, CA 94608.

Entire Agreement. This letter, along with the CIIAA and the Option agreement to be entered into between you and the Company, sets forth the terms of your employment with the Company and supersedes any prior representations or agreements including, but not limited to, any representations made during your recruitment, interviews or pre-employment negotiations, whether written or oral. This letter, including, but not limited to, its at-will employment provision, may not be modified or amended except by a written agreement signed by you and the Company's Chief Executive Officer.

We look forward to your favorable reply and to working with you at 4D Molecular Therapeutics.

Sincerely,

/s/ David Kim

David Kim, CEO

Agreed to and accepted:

Signature: /s/ August Moretti

Printed Name: August Moretti

Date: 1/8/2019

Enclosures: Confidential Information and Invention Assignment Agreement

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the use in this Registration Statement on Form S-1 of 4D Molecular Therapeutics, Inc. of our report dated June 19, 2020, except for (i) the effects of disclosing net loss per share information, (ii) the segment information, and (iii) the matters that raise substantial doubt about the Company's ability to continue as a going concern discussed in Notes 14, 2, and 1, respectively, to the financial statements, as to which the date is October 14, 2020, relating to the financial statements of 4D Molecular Therapeutics, Inc., which appears in this Registration Statement. We also consent to the reference to us under the heading "Experts" in such Registration Statement.

/s/ PricewaterhouseCoopers LLP

San Jose, California
December 7, 2020