Filed pursuant to Rule 424(b)(4)
File No. 333-256608
File No. 333-257158

Prospectus

14,035,789 shares

Common stock

This is an initial public offering of shares of common stock by Verve Therapeutics, Inc. We are offering 14,035,789 shares of our common stock. The initial public offering price is $19.00 per share.

Prior to this offering, there has been no public market for our common stock. Our common stock has been approved for listing on the Nasdaq Global Select Market under the symbol "VERV."

We are an "emerging growth company" as that term is used in the Jumpstart Our Business Startups Act of 2012 and, as such, have elected to comply with certain reduced public company reporting requirements for this prospectus and future filings. See "Prospectus summary—Implications of being an emerging growth company and a smaller reporting company."

	Per share	Total
Initial public offering price	$ 19.00	$266,679,991
Underwriting discounts and commissions(1)	$ 1.33	$ 18,667,599
Proceeds to Verve Therapeutics, Inc., before expenses	$ 17.67	$248,012,392

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

We have granted the underwriters an option for a period of 30 days to purchase up to 2,105,368 additional shares of common stock from us at the public offering price, less underwriting discounts and commissions.

Investing in our common stock involves a high degree of risk. See "Risk factors" beginning on page 13 of this prospectus.

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.

One or more funds and/or accounts affiliated with Wellington Management, Fidelity Management & Research Company LLC and Casdin Capital (collectively, the "cornerstone investors") have indicated an interest, severally and not jointly, in purchasing up to an aggregate of $75 million in shares in this offering at the initial public offering price. Because this indication of interest is not a binding agreement or commitment to purchase, the cornerstone investors may determine to purchase more, less or no shares in this offering or the underwriters may determine to sell more, less or no shares to any of the cornerstone investors. The underwriters will receive the same discount on any of our shares purchased by the cornerstone investors as they will from any other shares sold to the public in this offering.

The underwriters expect to deliver the shares of common stock to purchasers on or about June 21, 2021.

J.P. Morgan **Jefferies** **Guggenheim Securities** **William Blair**

June 16, 2021

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Neither we nor the underwriters have authorized anyone to provide you with any information other than that contained in this prospectus, any amendment or supplement to this prospectus or in any free writing prospectus we may authorize to be delivered or made available to you. We and the underwriters take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. We are offering to sell, and seeking offers to buy, shares of our common stock only in jurisdictions where offers and sales are permitted. The information contained in this prospectus is accurate only as of the date of this prospectus, regardless of the time of delivery of this prospectus or any sale of shares of our common stock. Our business, financial condition, results of operations and prospects may have changed since that date.

For investors outside 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 in the United States. Persons outside 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 the United States.

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 investing in our common stock, you should carefully read this entire prospectus, including our consolidated financial statements and the related notes thereto and the information set forth in the sections titled "Risk factors" and "Management's discussion and analysis of financial condition and results of operations" before making an investment decision. As used in this prospectus, unless the context otherwise requires, references to "we," "us," "our" and "Verve" refer to Verve Therapeutics, Inc. and its consolidated subsidiaries.

Overview

We are a genetic medicines company pioneering a new approach to the care of cardiovascular disease, or CVD, transforming treatment from chronic management to single-course gene editing medicines. Despite advances in treatment over the last 50 years, CVD remains the leading cause of death worldwide. The current paradigm of chronic care is fragile – requiring rigorous patient adherence, extensive healthcare infrastructure and regular healthcare access – and leaves many patients without adequate care. Our goal is to disrupt the chronic care model for CVD by providing a new therapeutic approach with single-course *in vivo* gene editing treatments focused on addressing the root causes of this highly prevalent and life-threatening disease. Our initial two programs target PCSK9 and ANGPTL3, respectively, genes that have been extensively validated as targets for lowering blood lipids, such as low-density lipoprotein cholesterol, or LDL-C. We believe that editing these genes could potently and durably lower LDL-C throughout the lifetime of patients with or at risk for atherosclerotic cardiovascular disease, or ASCVD, the most common form of CVD.

Transforming cardiovascular care

CVD collectively refers to diseases of the heart and blood vessels, of which ASCVD is a large subset. In ASCVD, cholesterol drives the development of atherosclerotic plaque, a mixture of cholesterol, cells and cellular debris in the wall of a blood vessel that results in the hardening of the arteries. High cumulative life-long exposure to blood cholesterol, which is carried in each of low-density lipoprotein, or LDL, triglyceride-rich lipoprotein, or TRL, or lipoprotein (a), or Lp(a), is a root cause of ASCVD.

The relationship between lowering of cumulative LDL-C exposure and reduction in the risk of ASCVD is among the best understood relationships in medicine. However, the current standard of care to lower LDL-C utilizes continuous, life-long treatment, and due to the limitations of this chronic care model, cumulative exposure to LDL-C for many patients with ASCVD remains insufficiently controlled. As a result, a large proportion of patients with established ASCVD have LDL-C levels above clinical treatment guidelines from the American Heart Association, or the AHA, and the American College of Cardiology, or the ACC, leaving them at risk for recurrent ASCVD events and the potential for invasive medical procedures or even death. Furthermore, given the silent nature of the damage done by elevated LDL-C, many patients at risk for ASCVD do not properly appreciate the therapeutic benefits of consistent treatment as well as the substantial risk of foregoing treatment, focusing instead on the heavy, life-long medication burden of daily pills, lifestyle changes and other chronic approaches.

We believe that single-course gene editing medicines that potently and durably control cumulative LDL-C exposure could fundamentally disrupt the chronic care model for treating patients with or at risk for ASCVD and relieve the significant burden placed on patients, providers and the healthcare system.

Our approach

Our approach leverages multiple breakthroughs in 21st century biomedicine—human genetic analysis, gene editing, messenger RNA, or mRNA, -based therapies and lipid nanoparticle, or LNP, delivery—to target genes that are predominantly expressed in the liver and disrupt the production of proteins that cause CVD. Our gene editing programs target validated genes in the liver that are supported by extensive human genetics and human pharmacology data and are known to be implicated in CVD. We use base editing for our initial programs, a next-generation gene editing approach that enables precise and efficient editing at the single base level in the genome without making a double-stranded break in the DNA. If standard CRISPR-Cas gene editing approaches are akin to “scissors” for the genome, base editors are akin to “pencils,” erasing and rewriting one letter in a gene**.** Our gene editing programs consist of LNPs that encapsulate mRNA encoding for a gene or base editor as well as a guide RNA, or gRNA, targeting the gene of interest expressed in the liver.

We believe that our approach will help us achieve our goal of delivering single-course gene editing treatments on a global scale for millions of patients with CVD, as it benefits from the following advantages:

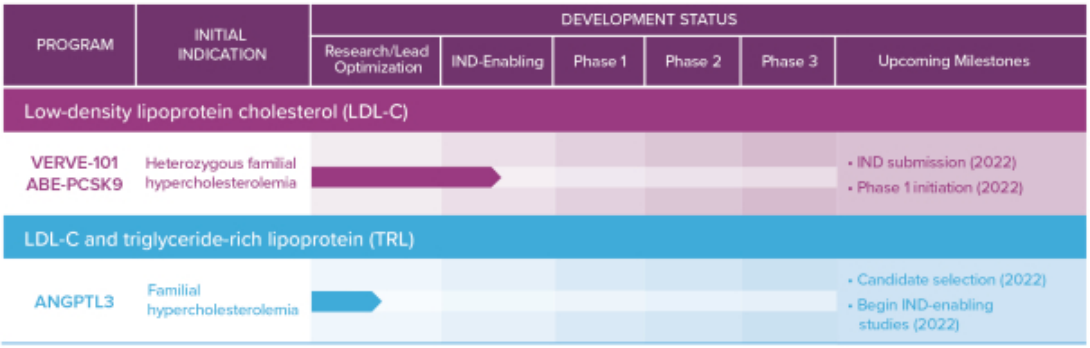
- Our approach specifically targets genes that are predominantly expressed in the liver and have been validated through human genetics research.
- We are focused on targeting distinct pathways to create a suite of complementary single-course gene editing treatments to broadly reduce blood lipids and ASCVD risk.
- We are leveraging gene editing technologies, including base editing, to make a permanent change in the target gene resulting in potent, durable and life-long lowering of blood lipids through a single course of treatment.
- All of our gene editing programs utilize non-viral LNP delivery of a gene editor to the liver designed and optimized to reduce or avoid safety risks.
- We have designed our single-course treatments as LNPs encapsulating mRNA and gRNA, which we believe will enhance our potential to manufacture our gene editing programs at scale.

Our pipeline

We are advancing a pipeline of single-course *in vivo* gene editing programs, each designed to mimic natural disease resistance mutations and turn off specific genes in order to lower blood lipids, thereby reducing the risk of ASCVD. Our initial programs focus on PCSK9 and ANGPTL3, two genes that regulate levels of blood lipids. We are developing these gene editing treatments initially for patients with familial hypercholesterolemia, or FH, a genetic disease that causes life-long severely elevated blood cholesterol, leading to increased risk of early-onset ASCVD and which is estimated to affect approximately 31 million patients globally. We intend to use a stepwise clinical development plan for these programs, evaluating efficacy and safety in these genetic populations and then, if successful, expanding into larger populations of patients with established ASCVD, which represents hundreds of millions of potential patients globally. Ultimately, we believe that our single-course gene editing treatment could be useful to people at risk for ASCVD as a preventative measure in the general population.

Our initial indication, FH, is an autosomal dominant genetic disorder that results in life-long severely elevated blood LDL-C, leading to increased risk of early-onset ASCVD. Individuals with FH may harbor one mutant allele and are thereby heterozygous for the disease, known as HeFH, or two mutated alleles and are therefore homozygous for the disease, known as HoFH, with HoFH typically being more severe than HeFH. While dietary and lifestyle modifications are important for LDL-C lowering in patients with FH, multidrug treatment is often required to achieve recommended LDL-C levels. Treatment for FH patients tends to start earlier than those with or at risk for ASCVD without FH, and typically follows a more aggressive course with multidrug treatment given the elevated risk of early-onset ASCVD.

Our current pipeline of *in vivo* gene editing programs for ASCVD is shown below:



We envision expanding beyond our PCSK9 and ANGPTL3 programs to develop a suite of single-course gene editing treatments designed to comprehensively and robustly address additional independent causes of CVD. We are exploring additional targets in two categories: lipoprotein targets for ASCVD and other liver-cardiovascular targets for cardiomyopathy, thrombotic disorders or cardiometabolic disorders. We plan to continue to focus on programs where the target has biology substantially validated by human genetics and, in many cases, by clinical development programs using other modalities.

VERVE-101

Our lead product candidate, VERVE-101, is designed to be a single-course gene editing treatment that permanently turns off the PCSK9 gene in the liver. PCSK9 is a highly validated target that plays a critical role in controlling blood LDL-C through its regulation of the LDL receptor, or LDLR. Reduction of PCSK9 protein in the blood improves the ability of the liver to clear LDL-C from the blood.

VERVE-101 utilizes LNP-mediated delivery to target the liver and base editing technology to make a single A-to-G base change at a specific site in the PCSK9 gene in order to disrupt PCSK9 protein production. We discovered VERVE-101 based on screening of a large library of gRNA candidates, evaluation of multiple LNP formulations and optimization of the adenine base editor, or ABE, mRNA construct. We have studied VERVE-101 and its precursor formulations extensively in mouse and non-human primate, or NHP, models, in which we observed durable and specific editing of the PCSK9 gene in the liver and significant decreases in blood PCSK9 protein and blood LDL-C.

In an ongoing *in vivo* proof-of-concept study in NHPs, we observed substantial lowering of LDL-C levels that was sustained over an extended period of time following treatment. In this study, following a single intravenous infusion of a base editor targeting PCSK9, we observed an average reduction of blood PCSK9 protein of 89%

accompanied by an average reduction of blood LDL-C levels of 59% at two weeks after treatment. This LDL-C reduction was maintained at an average of 62% for ten months following treatment. If we are able to achieve similar reductions in PCSK9 protein levels in humans, we believe this could result in marked and sustained LDL-C reductions of approximately 60%, which would potentially offer superior cumulative LDL-C lowering to what has been clinically demonstrated with other PCSK9-targeting treatment modalities.

In addition, in our preclinical studies in NHPs, VERVE-101 has been well tolerated following a single administration, with only mild elevations in liver function tests that resolved within two weeks. In primary human hepatocytes treated with VERVE-101, we observed on-target editing at the PCSK9 target site and did not observe editing at any of 141 identified potential off-target sites.

Based on our preclinical data, we are advancing VERVE-101 initially for the treatment of heterozygous familial hypercholesterolemia, or HeFH. We plan to expand clinical development of VERVE-101 in a stepwise fashion beyond HeFH for the treatment of patients with established ASCVD. We have initiated investigational new drug application, or IND, -enabling studies for VERVE-101, and intend to submit an IND for VERVE-101 to the FDA and comparable foreign regulatory authorities in 2022, followed by initiation of clinical development for patients with HeFH.

ANGPTL3 program

Our second program is designed to permanently turn off the ANGPTL3 gene in the liver. ANGPTL3 is a key regulator of cholesterol and triglyceride metabolism. We believe that disrupting ANGPTL3 protein production may lead to reductions in LDL-C and triglyceride levels through a mechanism distinct from that of PCSK9. We plan to develop this program initially for the treatment of FH, including both homozygous familial hypercholesterolemia, or HoFH, which affects approximately 1,300 patients in the United States, as well as the more prevalent HeFH indication. Similar to our approach with VERVE-101, we plan to expand the clinical development of our ANGPTL3 program in a stepwise fashion beyond FH to patients with established ASCVD. Ultimately, we believe that our ANGPTL3 program may also be useful to people at risk for ASCVD as a preventative measure in the general population.

In ongoing preclinical studies of our ANGPTL3 program in NHPs, we observed an average reduction of blood ANGPTL3 protein levels of 96% during the ten-month period following a single treatment. We anticipate nominating a lead development candidate for our ANGPTL3 program and initiating IND-enabling studies in 2022.

Our strategy

To achieve our vision of transforming treatment for patients with CVD from chronic care to single-course gene editing medicines, we are executing a strategy with the following key elements:

- Employ a stepwise approach to realize the full potential of VERVE-101, with initial development for the treatment of patients with HeFH followed by expansion to the broader population of patients with or at risk for ASCVD.
- Expand our pipeline of single-course gene editing treatments within ASCVD and beyond to additional CVD indications.
- Leverage our expertise and access to multiple gene editing technologies to become the leader in gene editing for CVD.
- Advance our internal LNP capabilities to complement our external LNP collaborations.

- Prioritize rapid iteration of product candidates in NHP preclinical models as an early development strategy.
- Develop manufacturing capabilities to produce *in vivo* gene editing medicines at scale.
- Build the leading cardiovascular gene editing company by maintaining a dynamic culture that attracts and retains a talented and collaborative team.

Our team and our history

Since our founding in 2018, we have built an organization and culture driven by a talented team of individuals who embody the meaning behind our name – vigor, spirit and enthusiasm – and who are motivated by a common goal of transforming the care of patients with or at risk for CVD.

Members of our leadership team have extensive collective experience in human genetics, gene editing, CVD, and drug development and commercialization. Our chief executive officer, Sekar Kathiresan, M.D., is a preventive cardiologist who has made groundbreaking discoveries of genetic mutations that confer resistance to CVD. Andrew Ashe, J.D., our president and chief operating officer, is an accomplished biotech executive with over 20 years of experience in operations and legal management. Andrew Bellinger, M.D., Ph.D., our chief scientific officer, is a cardiologist with proven expertise in drug delivery, drug development and translational medicine.

We have in-licensed technologies and intellectual property covering various elements of gene editing, including base editing and CRISPR nucleases, as well as multiple LNPs, with licenses from Beam Therapeutics Inc., The Broad Institute, Inc., or Broad, Editas Medicine, Inc., the President and Fellows of Harvard College, or Harvard, Massachusetts General Hospital and Acuitas Therapeutics Inc. In addition, since our inception through March 31, 2021, we have raised $216.5 million in capital. Our investors include premier venture capital funds, healthcare-dedicated funds, major mutual funds and other leading investors that share our vision of transforming the treatment of CVD from chronic management to single-course gene editing medicines.

Risks associated with our business

Our business is subject to a number of risks of which you should be aware before making an investment decision. These risks are discussed more fully in the “Risk factors” section of this prospectus. These risks include, but are not limited to, the following:

- Even if we consummate this offering, we will need substantial additional funding. If we are unable to raise capital when needed, we could be forced to delay, reduce or eliminate our product development programs or commercialization efforts;
- Our limited operating history may make it difficult for you to evaluate the success of our business to date and to assess our future viability;
- We are very early in our development efforts, and we have not yet completed IND-enabling studies or initiated clinical development of any product candidate. As a result, we expect it will be many years before we commercialize any product candidate, if ever. If we are unable to advance our current or future product candidates into and through clinical trials, obtain marketing approval and ultimately commercialize our product candidates or experience significant delays in doing so, our business will be materially harmed;

- Gene editing, including base editing, is a novel technology in a rapidly evolving field that is not yet clinically validated for human therapeutic use. The approaches we are taking to discover and develop novel therapeutics are unproven and may never lead to marketable products. We are focusing our research and development efforts on gene editing using base editing technology, but other gene editing technologies may be discovered that provide significant advantages over base editing, which could materially harm our business;
- The outcome of preclinical studies and earlier-stage clinical trials may not be predictive of future results or the success of later preclinical studies and clinical trials;
- If any of the product candidates we may develop, or the delivery modes we rely on to administer them, cause serious adverse events, undesirable side effects or unexpected characteristics, such events, side effects or characteristics could delay or prevent regulatory approval of the product candidates, limit the commercial potential or result in significant negative consequences following any potential marketing approval;
- Adverse public perception of genetic medicines, and gene editing and base editing in particular, may negatively impact regulatory approval of, and/or demand for, our potential products;
- Genetic medicines are complex and difficult to manufacture. We could experience delays in satisfying regulatory authorities or production problems that result in delays in our development programs, limit the supply of our product candidates we may develop, or otherwise harm our business;
- We rely, and expect to continue to rely, on third parties to conduct some or all aspects of our product manufacturing, research and preclinical and clinical testing, and these third parties may not perform satisfactorily;
- We have entered into collaborations, and may enter into additional collaborations, with third parties for the research, development, manufacture and commercialization of programs or product candidates. If these collaborations are not successful, our business could be adversely affected;
- If we or our licensors are unable to obtain, maintain, defend and enforce patent rights that cover our gene editing technology and product candidates or if the scope of the patent protection obtained is not sufficiently broad, our competitors could develop and commercialize technology and products similar or identical to ours, and our ability to successfully develop and commercialize our technology and product candidates may be adversely affected;
- If we fail to comply with our obligations in our intellectual property licenses arrangements with third parties, or otherwise experience disruptions to our business relationships with our licensors, we could lose intellectual property rights that are important to our business;
- The intellectual property landscape around genome editing technology, including base editing, is highly dynamic, and third parties may initiate legal proceedings alleging that we are infringing, misappropriating, or otherwise violating their intellectual property rights, the outcome of which would be uncertain and may prevent, delay or otherwise interfere with our product discovery and development efforts;
- We face substantial competition, which may result in others discovering, developing or commercializing products before us or more successfully than we do; and
- The COVID-19 pandemic may affect our ability to initiate and complete preclinical studies, delay the initiation of future clinical trials, disrupt regulatory activities or have other adverse effects on our business and

operations. In addition, this pandemic has adversely impacted economies worldwide, both of which could result in adverse effects on our business, operations and ability to raise capital.

Our corporate information

Our principal executive offices are located at 500 Technology Square, Suite 901, Cambridge, Massachusetts 02139, and our telephone number is (617) 603-0070. Our website address is http://www.vervetx.com. The information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

The Verve Therapeutics name is our trademark. We own or have rights to, or have applied for, trademarks, service marks and trade names that we use in connection with the operation of our business, including our corporate name, logos and website names. Other trademarks, service marks and trade names appearing in this prospectus are the property of their respective owners. Solely for convenience, some of the trademarks, service marks and trade names referred to in this prospectus are listed without the ® and ™ symbols, but we will assert, to the fullest extent under applicable law, our rights to our trademarks, service marks and trade names.

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, or the JOBS Act. As a result, we are able to take advantage of certain reduced reporting requirements that are otherwise applicable to public companies, including delaying auditor attestation of internal control over financial reporting, providing only two years of audited financial statements and related Management’s discussion and analysis of financial condition and results of operations and reduced executive compensation disclosures.

We may remain an emerging growth company for up to five years from the date of the first sale in this offering. However, if certain events occur prior to the end of such five-year period, including if we become a “large accelerated filer,” under SEC rules, our annual gross revenue exceeds $1.07 billion, or we issue more than $1 billion of non-convertible debt in any three-year period, we will cease to be an emerging growth company prior to the end of such five-year period.

We have elected to take advantage of certain of the reduced disclosure obligations in the registration statement of which this prospectus is a part and may elect to take advantage of other reduced reporting requirements in future filings. In particular, we have provided only two years of audited financial statements and have not included all of the executive compensation related information that would be required if we were not an emerging growth company. As a result, the information that we provide to our stockholders may be different than what you might receive from other public reporting companies in which you hold equity interests. In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. We have elected not to “opt out” of such extended transition period, which means that when a standard is issued or revised and it has different application dates for public or private companies, we can adopt the new or revised standard at the time private companies adopt the new or revised standard and may do so until such time that we either (1) irrevocably elect to “opt out” of such extended transition period or (2) no longer qualify as an emerging growth company.

We are also a “smaller reporting company,” meaning that the market value of our shares held by non-affiliates plus the proposed aggregate amount of gross proceeds to us as a result of this offering is less than $700 million and our annual revenue was less than $100 million during the most recently completed fiscal year. We may continue to be a smaller reporting company after this offering if either (i) the market value of our shares held

by non-affiliates is less than $250 million or (ii) our annual revenue was less than $100 million during the most recently completed fiscal year and the market value of our shares held by non-affiliates is less than $700 million. If we are a smaller reporting company at the time we cease to be an emerging growth company, we may continue to rely on exemptions from certain disclosure requirements that are available to smaller reporting companies. Specifically, as a smaller reporting company, we may choose to present only the two most recent fiscal years of audited financial statements in our Annual Report on Form 10-K and have reduced disclosure obligations regarding executive compensation, and, similar to emerging growth companies, if we are a smaller reporting company with less than $100 million in annual revenue, we would not be required to obtain an attestation report on internal control over financial reporting issued by our independent registered public accounting firm.

The offering

Common stock offered by us	14,035,789 shares
Option to purchase additional shares	We have granted the underwriters an option for a period of 30 days to purchase up to 2,105,368 additional shares of our common stock at the initial public offering price less underwriting discounts and commissions.
Common stock to be outstanding immediately following this offering	46,110,444 shares (48,215,812 shares if the underwriters exercise their option to purchase additional shares in full).
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $244.6 million (or approximately $281.8 million if the underwriters exercise their option to purchase additional shares in full), after deducting underwriting discounts and commissions and estimated offering expenses payable by us. We intend to use the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, for continued research and development of VERVE-101, including completion of IND-enabling studies and initiation of Phase 1 clinical trials; for continued research and development of our ANGPTL3 program, including preclinical research, completion of IND-enabling studies and initiation of Phase 1 clinical trials; for research and development to support new programs and optimization of existing technology, including new targets, novel LNP delivery technology and novel process development to enable manufacturing at scale; and for working capital and other general corporate purposes. See “Use of proceeds.”
Risk factors	You should read the “Risk factors” section of this prospectus for a discussion of factors to consider carefully before deciding to invest in shares of our common stock.
Directed share program	At our request, the underwriters have reserved up to 3.0% of the shares of common stock being offered by this prospectus for sale, at the initial public offering price, to our officers, certain employees and other persons associated with us. If these persons purchase reserved shares, it will reduce the number of shares available for sale to the general public. Any reserved shares that are not so purchased will be offered by the underwriters to the general public on the same terms as the other shares offered by this prospectus. For further information regarding our directed share program, see “Underwriting”.
Indications of interest	Prior to the date hereof, the cornerstone investors have indicated an interest, severally and not jointly, in purchasing up to an aggregate of $75 million in shares in this offering at the initial public offering price. Because this indication

	of interest is not a binding agreement or commitment to purchase, the cornerstone investors may determine to purchase more, less or no shares in this offering or the underwriters may determine to sell more, less or no shares to any of the cornerstone investors. The underwriters will receive the same discount on any of our shares purchased by the cornerstone investors as they will from any other shares sold to the public in this offering.
Nasdaq Global Select Market symbol	"VERV"

The number of shares of our common stock to be outstanding after this offering is based on 3,475,634 shares of our common stock outstanding as of May 31, 2021, which includes 313,620 shares of unvested restricted stock subject to a repurchase option, and gives effect to the automatic conversion of all outstanding shares of our preferred stock into 27,720,923 shares of our common stock upon the closing of this offering.

The number of shares of our common stock to be outstanding after this offering excludes:

- 5,258,661 shares of common stock issuable upon the exercise of stock options outstanding as of May 31, 2021 under our 2018 Equity Incentive Plan, as amended, or the 2018 Plan, at a weighted average exercise price of $4.26 per share;
- 1,163,189 shares of common stock reserved for future issuance under the 2018 Plan as of May 31, 2021; and
- 3,466,530 and 433,316 additional shares of our common stock available for future issuance under our 2021 Stock Incentive Plan, of which our board of directors has granted options to purchase an aggregate of 464,519 shares of common stock to certain of our employees, executive officers and non-employee directors effective upon the commencement of trading of our common stock on the Nasdaq Stock Market with an exercise price per share equal to the initial public offering price in this offering, and our Amended and Restated 2021 Employee Stock Purchase Plan, respectively, as well as any automatic increases in the number of shares of common stock reserved for future issuance under these plans.

Unless otherwise indicated, all information in this prospectus reflects and assumes:

- a one-for-9.2595 reverse stock split of our common stock, and a proportionate adjustment in the ratio at which our preferred stock is convertible into common stock, which was effected on June 11, 2021;
- the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 27,720,923 shares of our common stock upon the closing of this offering;
- our issuance of an aggregate of 878,098 shares of common stock to Broad and Harvard upon the closing of this offering pursuant to our Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under "Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College";
- no exercise of the outstanding options described above;
- no exercise by the underwriters of their option to purchase additional shares of our common stock; and
- the filing and effectiveness of our restated certificate of incorporation and the adoption of our amended and restated bylaws upon the closing of this offering.

Summary consolidated financial data

You should read the following summary consolidated financial data together with our consolidated financial statements and the related notes appearing elsewhere in this prospectus and the "Management's discussion and analysis of financial condition and results of operations" section of this prospectus. We have derived the consolidated statement of operations data for the years ended December 31, 2020 and 2019 from our audited consolidated financial statements appearing elsewhere in this prospectus. The consolidated statement of operations data for the three months ended March 31, 2021 and 2020 and the consolidated balance sheet data as of March 31, 2021 have been derived from our unaudited condensed consolidated financial statements appearing elsewhere in this prospectus and have been prepared on the same basis as our audited consolidated financial statements. Our historical results are not necessarily indicative of the results that may be expected in the future and our interim results are not necessarily indicative of results to be expected for a full fiscal year or any other interim period.

	Year ended December 31,		Three months ended March 31,	
	2020	2019	2021	2020
	(in thousands, except share and per share data)			
Consolidated Statement of Operations Data:				
Operating expenses:				
Research and development	$ 35,371	$ 11,144	$ 11,345	$ 6,523
General and administrative	5,256	2,498	2,716	846
Total operating expenses	40,627	13,642	14,061	7,369
Loss from operations	(40,627)	(13,642)	(14,061)	(7,369)
Other income (expense):				
Change in fair value of preferred stock tranche liability	2,507	(4,883)	—	2,507
Change in fair value of antidilution rights liability	(5,359)	(982)	396	(882)
Change in fair value of success payment liability	(2,387)	(68)	382	64
Interest and other income (expense), net	162	278	20	77
Total other income (expense), net	(5,077)	(5,655)	798	1,766
Net loss	$ (45,704)	$ (19,297)	$ (13,263)	$ (5,603)
Net loss per share attributable to common stockholders, basic and diluted(1)	$ (20.31)	$ (15.11)	$ (4.99)	$ (2.92)
Weighted-average common shares used in calculating net loss per share attributable to common stockholders, basic and diluted	2,250,093	1,277,156	2,656,278	1,917,486
Pro forma net loss per share, basic and diluted(2)	$ (2.58)		$ (0.45)	
Pro forma weighted average common shares outstanding(2)	17,739,487		29,173,507	

(1) See Note 2 and Note 13 to our audited consolidated financial statements and Note 13 to our unaudited condensed consolidated financial statements included elsewhere in this prospectus for a description of the method used to calculate basic and diluted net loss per share attributable to common stockholders.

(2) The pro forma basic and diluted net loss per share for the three months ended March 31, 2021 and the year ended December 31, 2020 have been computed to give effect to the automatic conversion of all outstanding shares of our preferred stock into shares of common stock. The unaudited pro forma basic and diluted net loss per share for the three months ended March 31, 2021 and the year ended December 31, 2020 were computed using the weighted average number of shares of common stock outstanding, including the pro forma effect of the conversion of all outstanding shares of our preferred stock into shares of common stock, as if the closing of this offering had occurred on the later of January 1, 2020 or the original issuance dates of the respective preferred stock.

	As of March 31, 2021		
	Actual	Pro forma(2)	Pro forma, as adjusted(3)
		(in thousands)	
Consolidated Balance Sheet Data:			
Cash and cash equivalents	$ 99,397	$ 99,397	$ 344,163
Marketable securities	50,126	50,126	50,126
Working capital(1)	145,157	145,157	390,432
Total assets	158,169	158,169	402,272
Total liabilities	15,681	9,161	8,652
Convertible preferred stock	218,919	—	—
Total stockholders' equity (deficit)	(76,431)	149,008	393,620

(1) We define working capital as current assets less current liabilities.

(2) The pro forma balance sheet data give effect to (i) our issuance of an aggregate of 878,098 shares of common stock to The Broad Institute and the President and Fellows of Harvard College upon the closing of this offering pursuant to our Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under "Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College," and (ii) the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 27,720,923 shares of our common stock upon the closing of this offering.

(3) The pro forma as adjusted balance sheet data give further effect to our issuance and sale of 14,035,789 shares of our common stock in this offering at the initial public offering price of $19.00 per share, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

Risk factors

Investing in our common stock involves a high degree of risk. You should carefully consider the risks and uncertainties described below together with all of the other information contained in this prospectus, including our consolidated financial statements and the related notes appearing elsewhere in this prospectus, before deciding to invest in our common stock. The risks described below are not the only risks facing us. The occurrence of any of the following risks, or additional risks and uncertainties not presently known to us or that we currently believe to be immaterial, could cause our business, prospects, operating results and financial condition to suffer materially. In such event, the trading price of our common stock could decline and you might lose all or part of your investment.

Risks related to our financial position and need for additional capital

We have incurred significant losses since our inception and have no products approved for sale. We expect to incur losses for the foreseeable future and may never achieve or maintain profitability.

Since our inception, we have devoted substantially all of our financial resources and efforts to research and development, including preclinical studies, and have incurred significant operating losses. Our net loss was $19.3 million and $45.7 million for the years ended December 31, 2019 and 2020, respectively, and $13.3 million for the three months ended March 31, 2021. As of March 31, 2021, we had an accumulated deficit of $79.8 million. To date, we have generated no revenue and have financed our operations primarily through sales of our preferred stock. We have devoted all of our efforts to research and development, are still in the early stages of development of our research programs and have not commenced clinical development of any product candidates. We expect to continue to incur significant expenses and operating losses for the foreseeable future. Our operating expenses and net losses may fluctuate significantly from quarter to quarter and year to year. We anticipate that our expenses will increase substantially if and as we:

- continue our current research programs and our preclinical development of product candidates from our current research programs;
- seek to identify additional research programs and additional product candidates;
- advance our existing and future product candidates into clinical development;
- initiate preclinical studies and clinical trials for any additional product candidates we identify and develop or expand development of existing programs into additional patient populations;
- maintain, expand, enforce, defend and protect our intellectual property portfolio and provide reimbursement of third-party expenses related to our patent portfolio;
- seek regulatory and marketing approvals for any of our product candidates that we develop;
- seek to identify, establish and maintain additional collaborations and license agreements, and the success of those collaborations and license agreements;
- make milestone payments to Beam Therapeutics Inc., or Beam, under our collaboration and license agreement with Beam, or the Beam Agreement, to Acuitas Therapeutics Inc., or Acuitas, under our non-exclusive license agreement with Acuitas, or the Acuitas Agreement, and to The Broad Institute, Inc., or Broad, and the President and Fellows of Harvard College, or Harvard, under our license agreement with Broad and Harvard (as amended, the Cas9 License Agreement), and under any additional future collaboration or license agreements that we obtain;
- ultimately establish a sales, marketing, and distribution infrastructure to commercialize any drug products for which we may obtain marketing approval, either by ourselves or in collaboration with others;

- generate revenue from commercial sales of product candidates we may develop for which we receive marketing approval;
- further develop our base editing technology;
- hire additional personnel including research and development, clinical and commercial personnel;
- add operational, financial and management information systems and personnel, including personnel to support our product development;
- acquire or in-license products, intellectual property, medicines and technologies;
- satisfy any post-marketing requirements, such as a cardiovascular outcomes trial, or CVOT;
- establish commercial-scale current good manufacturing practices capabilities through a third-party or our own manufacturing facility; and
- operate as a public company.

In addition, our expenses will increase if, among other things:

- we are required by the U.S. Food and Drug Administration, or the FDA, the European Medicines Agency, or the EMA, or other regulatory authorities to perform trials or studies in addition to, or different than, those expected;
- there are any delays in completing our clinical trials or the development of any of our product candidates; or
- there are any third-party challenges to our intellectual property or we need to defend against any intellectual property-related claim.

Even if we obtain marketing approval for, and are successful in commercializing, one or more of our product candidates, we expect to incur substantial additional research and development and other expenditures to develop and market additional product candidates and/or to expand the approved indications of any marketed product. We may encounter unforeseen expenses, difficulties, complications, delays and other unknown factors that may adversely affect our business. The size of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenue.

We have never generated revenue from product sales and may never achieve or maintain profitability.

We have not initiated clinical development of any product candidate and expect that it will be many years, if ever, before we have a product candidate ready for commercialization. To become and remain profitable, we must succeed in developing, obtaining the necessary regulatory approvals for and eventually commercializing a product or products that generate significant revenue. The ability to achieve this success will require us to be effective in a range of challenging activities, including:

- completing preclinical testing and clinical trials;
- identifying additional product candidates;
- obtaining marketing approval for these product candidates;
- manufacturing, marketing and selling any products for which we may obtain marketing approval; and
- achieving market acceptance of products for which we may obtain marketing approval as viable treatment options.

We are only in the preliminary stages of these activities and there is no assurance that we will be successful in these activities and, even if we are, may never generate revenues that are significant enough to achieve profitability. We are currently only in the preclinical stage of our research programs. Because of the numerous risks and uncertainties associated with pharmaceutical product development, we are unable to accurately predict the timing or amount of increased expenses or when, or if, we will be able to generate revenue or achieve profitability.

Even if we are able to generate revenue from the sale of any approved products, we may not become profitable and may need to obtain additional funding to continue operations. Our revenue 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 obtain coverage and reimbursement, and whether we own the commercial rights for that territory. If the number of our addressable patients is not as significant as we estimate, the indication approved by regulatory authorities is narrower than we expect, or the treatment population is narrowed by competition, physician choice or treatment guidelines, we may not generate significant revenue from sales of such products, even if approved.

Even if we consummate this offering, we will need substantial additional funding. If we are unable to raise capital when needed, we could be forced to delay, reduce or eliminate our product development programs or commercialization efforts.

We expect to devote substantial financial resources to our ongoing and planned activities, particularly as we conduct research, development and preclinical testing, initiate clinical trials and potentially seek marketing approval for our current and any additional product candidates we may develop. We expect our expenses to increase substantially in connection with our ongoing activities, particularly as we advance our preclinical activities and initiate clinical trials. In addition, if we obtain marketing approval for any of our product candidates, we expect to incur significant commercialization expenses related to product manufacturing, sales, marketing and distribution. Furthermore, upon the closing of this offering, we expect to incur additional costs associated with operating as a public company. Accordingly, we will need to obtain substantial additional funding in connection with our continuing operations. If we are unable to raise capital or obtain adequate funds when needed or on acceptable terms, we may be forced to delay, limit, reduce or terminate our research and development programs or any future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

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

- the costs of acquiring licenses for the delivery modalities that will be used with our product candidates;
- the scope, progress, results and costs of discovery, preclinical and clinical development for any product candidates we may develop;
- the cost and timing of completion of commercial-scale manufacturing activities;
- the costs and timing of preparing, filing and prosecuting patent applications, maintaining and enforcing our intellectual property and proprietary rights, and defending intellectual property-related claims, including claims of infringement, misappropriation or other violation of third-party intellectual property;
- the costs, timing and outcome of regulatory review of the product candidates we may develop;
- the costs of future commercialization activities, either by ourselves or in collaboration with others, including product sales, marketing, manufacturing, and distribution for any product candidates for which we receive marketing approval;
- the costs of satisfying any post-marketing requirements, such as a CVOT;

- the revenue, if any, received from commercial sales of product candidates we may develop for which we receive marketing approval;
- the success of our license agreements and our collaborations;
- our ability to establish and maintain additional collaborations on favorable terms, if at all;
- the achievement of milestones or occurrence of other developments that trigger payments under any additional collaboration agreements we obtain;
- the extent to which we acquire or in-license products, intellectual property and technologies;
- the costs of operational, financial and management information systems and associated personnel; and
- the costs of operating as a public company.

Identifying potential product candidates and conducting preclinical testing and clinical trials is a time-consuming, expensive and uncertain process that takes years to complete, and we may never generate the necessary data or results required to obtain marketing approval and achieve product sales. In addition, even if we successfully identify and develop product candidates and those are approved, we may not achieve commercial success. Our commercial revenues, if any, may not be sufficient to sustain our operations. Accordingly, we will need to continue to rely on additional financing to achieve our business objectives.

As of March 31, 2021, we had cash, cash equivalents and marketable securities of approximately $149.5 million. We believe that the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, will enable us to fund our operating expenses and capital expenditure requirements into 2024. However, we have based this estimate on assumptions that may prove to be wrong, and our operating plan may change as a result of many factors currently unknown to us. As a result, we could deplete our capital resources sooner than we currently expect and could be forced to see additional funding sooner than planned.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize any product candidates. We cannot be certain that additional funding will be available on acceptable terms, or at all. For example, while the potential impact and duration of the COVID-19 pandemic on the global economy and our business in particular may be difficult to assess or predict, the pandemic has resulted in, and may continue to result in, significant disruption of global financial markets, reducing our ability to access capital, which could in the future negatively affect our liquidity. We have no committed source of additional capital and, 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 our product candidates or other research and development initiatives. We could be required to seek collaborators for product candidates we may develop at an earlier stage than otherwise would be desirable or on terms that are less favorable than might otherwise be available or relinquish or license on unfavorable terms our rights to product candidates we may develop in markets where we otherwise would seek to pursue development or commercialization ourselves.

Any of the above events could significantly harm our business, prospects, financial condition and results of operations and cause the price of our common stock to decline.

Raising additional capital may cause dilution to our stockholders, including purchasers of our common stock in this offering, restrict our operations or require us to relinquish rights to our technologies or product candidates.

Until such time, if ever, as we can generate substantial revenues from product sales, we expect to finance our cash needs through a combination of equity offerings, debt financings, collaborations, strategic alliances and marketing, distribution or licensing arrangements. We do not have any source of committed external funds. To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, selling or licensing our assets, making capital expenditures, declaring dividends or encumbering our assets to secure future indebtedness.

If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings or other arrangements when needed or on terms acceptable to us, we would be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Our limited operating history may make it difficult for you to evaluate the success of our business to date and to assess our future viability.

We commenced operations in 2018 and are an early-stage company. Our operations to date have been limited to organizing and staffing our company, business planning, raising capital, developing our technology, identifying potential product candidates, securing intellectual property rights and undertaking preclinical studies. All of our research programs are still in the research or preclinical stage of development, and their risk of failure is high. We have not yet demonstrated our ability to initiate or complete any clinical trials, obtain marketing approvals, manufacture a clinical development or commercial scale product or arrange for a third party to do so on our behalf, or conduct sales and marketing activities necessary for successful product commercialization. In part because of this lack of experience, we cannot be certain that our ongoing preclinical studies will be completed on time or if the planned preclinical studies and clinical trials will begin or be completed on time, if at all. Consequently, any predictions you make about our future success or viability may not be as accurate as they could be if we had a longer operating history or a history of successfully developing and commercializing gene editing products.

Our limited operating history, particularly in light of the rapidly evolving genetic medicines field, may make it difficult to evaluate our technology and industry and predict our future performance. Our limited history as an operating company makes any assessment of our future success or viability subject to significant uncertainty. We will encounter risks and difficulties frequently experienced by early-stage companies in rapidly evolving fields. If we do not address these risks successfully, our business will suffer.

In addition, as our business grows, we may encounter unforeseen expenses, restrictions, difficulties, complications, delays and other known and unknown factors. We will need to transition at some point from a company with a research and development focus to a company capable of supporting commercial activities. We may not be successful in such a transition.

Our ability to use our net operating losses and research and development tax credit carryforwards to offset future taxable income or taxes may be subject to certain limitations.

We have a history of cumulative losses and anticipate that we will continue to incur significant losses in the foreseeable future; thus, we do not know whether or when we will generate taxable income necessary to utilize our net operating losses, or NOLs, or research and development tax credit carryforwards. As of December 31, 2020, we had federal NOL carryforwards of $49.2 million and state NOL carryforwards of $41.6 million.

In general, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, and corresponding provisions of state law, a corporation that undergoes an "ownership change," generally defined as a greater than 50 percentage point change (by value) in its equity ownership by certain stockholders over a three-year period, is subject to limitations on its ability to utilize its pre-change NOLs and research and development tax credit carryforwards to offset post-change taxable income or taxes. We have not conducted a study to assess whether any such ownership changes have occurred. We may have experienced such ownership changes in the past and may experience such ownership changes in the future as a result of this offering and/or subsequent changes in our stock ownership (which may be outside our control). As a result, if, and to the extent that, we earn net taxable income, our ability to use our pre-change NOLs and research and development tax credit carryforwards to offset such taxable income may be subject to limitations. Our NOLs or credits may also be impaired under state law.

There is also a risk that due to regulatory changes, such as suspensions on the use of NOLs, or other unforeseen reasons, our existing NOLs could expire or otherwise become unavailable to offset future income tax liabilities. As described below in "Changes in tax laws or in their implementation or interpretation may adversely affect our business and financial condition," the Tax Cuts and Jobs Act, or the Tax Act, as amended by the Coronavirus Aid, Relief, and Economic Security Act, or CARES Act, includes changes to U.S. federal tax rates and the rules governing NOL carryforwards that may significantly impact our ability to utilize our NOLs to offset taxable income in the future. For these reasons, even if we attain profitability, we may be unable to use a material portion of our NOLs and other tax attributes.

Risks related to discovery and development

We are very early in our development efforts, and we have not yet completed IND-enabling studies or initiated clinical development of any product candidate. As a result, we expect it will be many years before we commercialize any product candidate, if ever. If we are unable to advance our current or future product candidates into and through clinical trials, obtain marketing approval and ultimately commercialize our product candidates or experience significant delays in doing so, our business will be materially harmed.

We are very early in our development efforts and have focused our research and development efforts to date on research efforts and preclinical development. Currently, all of our programs are in preclinical development or in discovery. Our ability to generate product revenues, which we do not expect will occur for many years, if ever, will depend heavily on the successful development, marketing approval and eventual commercialization of our product candidates, which may never occur. We have not yet generated revenue from product sales or otherwise, and we may never be able to develop or commercialize a marketable product.

Commencing clinical trials in the United States is subject to acceptance by the FDA of an IND and finalizing the trial design based on discussions with the FDA and other regulatory authorities. In the event that the FDA requires us to complete additional preclinical studies or we are required to satisfy other FDA requests prior to commencing clinical trials, the start of our first clinical trials may be delayed. Even after we receive and incorporate guidance from these regulatory authorities, the FDA or other regulatory authorities could disagree that we have satisfied their requirements to commence any clinical trial or change their position on the

acceptability of our trial design or the clinical endpoints selected, which may require us to complete additional preclinical studies or clinical trials, delay the enrollment of our clinical trials or impose stricter approval conditions than we currently expect. There are equivalent processes and risks applicable to clinical trial applications in other countries, including countries in the European Union.

Commercialization of any product candidates we may develop will require preclinical and clinical development; regulatory and marketing approval in multiple jurisdictions, including by the FDA and the EMA; manufacturing supply, capacity and expertise; a commercial organization; and significant marketing efforts. The success of product candidates we may identify and develop will depend on many factors, including the following:

- timely and successful completion of preclinical studies, including toxicology studies, biodistribution studies and minimally efficacious dose studies in animals, where applicable;
- effective INDs or comparable foreign applications that allow commencement of our planned clinical trials or future clinical trials for any product candidates we may develop;
- successful enrollment and completion of clinical trials, including under the FDA's current Good Clinical Practices, or GCPs, current Good Laboratory Practices and any additional regulatory requirements from foreign regulatory authorities;
- positive results from our future clinical trials that support a finding of safety and effectiveness and an acceptable risk-benefit profile in the intended populations;
- receipt of marketing approvals from applicable regulatory authorities;
- establishment of arrangements through our own facilities or with third-party manufacturers for clinical supply and, where applicable, commercial manufacturing capabilities;
- establishment, maintenance, defense and enforcement of patent, trademark, trade secret and other intellectual property protection or regulatory exclusivity for any product candidates we may develop;
- commercial launch of any product candidates we may develop, if approved, whether alone or in collaboration with others;
- acceptance of the benefits and use of our product candidates we may develop, including method of administration, if and when approved, by patients, the medical community and third-party payers;
- effective competition with other therapies;
- maintenance of a continued acceptable safety, tolerability and efficacy profile of any product candidates we may develop following approval; and
- establishment and maintenance of healthcare coverage and adequate reimbursement by payers.

If we do not succeed in one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize any product candidates we may develop, which would materially harm our business. If we are unable to advance our product candidates to clinical development, obtain regulatory approval and ultimately commercialize our product candidates, or experience significant delays in doing so, our business will be materially harmed.

Gene editing, including base editing, is a novel technology that is not yet clinically validated for human therapeutic use. The approaches we are taking to discover and develop novel therapeutics are unproven and may never lead to marketable products.

We are focused on developing medicines utilizing gene editing technology, which is new and largely unproven. The base editing technologies that we have licensed and that we are utilizing with VERVE-101 and in our

ANGPTL3 program have not yet been clinically tested, nor are we aware of any clinical trials for safety or efficacy having been completed by third parties using our base editing or similar technologies. The scientific evidence to support the feasibility of developing product candidates based on gene editing technologies is both preliminary and limited. Successful development of our product candidates will require us to safely deliver a gene editor into target cells, optimize the efficiency and specificity of such product candidates and ensure the therapeutic selectivity of such product candidates. There can be no assurance that base editing technology will lead to the development of genetic medicines or that we will be successful in solving any or all of these issues.

Our future success is highly dependent on the successful development of gene editing technologies, cellular delivery methods and therapeutic applications of that technology. We may decide to alter or abandon our initial programs as new data become available and we gain experience in developing gene editing therapeutics. We cannot be sure that our technologies will yield satisfactory products that are safe and effective, scalable or profitable in our initial indications or any other indication we pursue. Adverse developments in the clinical development efforts of other gene editing technology companies could adversely affect our efforts or the perception of our product candidates by both investors and regulatory authorities.

Similarly, another new gene editing technology that has not been discovered yet may be determined to be more attractive than base editing. Moreover, if we decide to develop gene editing technologies other than those involving base editing, we cannot be certain we will be able to obtain rights to such technologies. Although all of our founders who currently provide consulting and advisory services to us in the area of base editing technologies have assignment of inventions obligations to us with respect to the services they perform for us, these assignment of inventions obligations are subject to limitations and do not extend to their work in other fields or to the intellectual property arising from their employment with their respective academic and research institutions. To obtain intellectual property rights assigned by these founders to such institutions, we would need to enter into license agreements with such institutions, which may not be available on commercially reasonable terms or at all. Any of these factors could reduce or eliminate our commercial opportunity and could have a material adverse effect on our business, financial condition, results of operations and prospects.

Development activities in the field of gene editing are currently subject to a number of risks related to the ownership and use of certain intellectual property rights that are subject to patent interference proceedings in the United States and opposition proceedings in Europe. For additional information regarding the risks that may apply to our and our licensors' intellectual property rights, see the section entitled "—Risks related to our intellectual property" for more information.

Additionally, public perception and related media coverage relating to the adoption of new therapeutics or novel approaches to treatment, as well as ethical concerns related specifically to gene editing, may adversely influence the willingness of subjects to participate in clinical trials, or, if any therapeutic is approved, of physicians and patients to accept these novel and personalized treatments. Physicians, health care providers and third-party payors often are slow to adopt new products, technologies and treatment practices, particularly those that may also require additional upfront costs and training. Physicians may not be willing to undergo training to adopt these novel and potentially personalized therapies, may decide the particular therapy is too complex or potentially risky to adopt without appropriate training, and may choose not to administer the therapy. Further, due to health conditions, genetic profile or other reasons, certain patients may not be candidates for the therapies. In addition, responses by federal and state agencies, Congressional committees and foreign governments to negative public perception, ethical concerns or financial considerations may result in new legislation, regulations or medical standards that could limit our ability to develop or commercialize any product candidates, obtain or maintain regulatory approval or otherwise achieve profitability. New government requirements may be established that could delay or prevent regulatory approval of our product candidates under development. It is impossible to predict whether legislative changes will be enacted, regulations, policies

or guidance changed, or interpretations by agencies or courts changed, or what the impact of such changes, if any, may be. Based on these and other factors, health care providers and payors may decide that the benefits of these new therapies do not or will not outweigh their costs.

The gene editing field is relatively new and is evolving rapidly. We are focusing our research and development efforts on gene editing using base editing technology, but other gene editing technologies may be discovered that provide significant advantages over base editing, which could materially harm our business.

To date, we have focused our efforts on gene editing technologies using base editing. Other companies have previously undertaken research and development of gene editing technologies using zinc finger nucleases, engineered meganucleases and transcription activator-like effector nucleases, but to date none have obtained marketing approval for a product candidate. There can be no certainty that base editing technology will lead to the development of genetic medicines or that other gene editing technologies will not be considered better or more attractive for the development of medicines. For example, Feng Zhang's group at the Massachusetts Institute of Technology, or MIT, and Broad, and, separately, Samuel Sternberg's group at Columbia University recently announced the discovery of the use of transposons, or "jumping genes." Transposons can insert themselves into different places in the genome and can be programmed to carry specific DNA sequences to specific sites, without the need for making double-stranded breaks in DNA. Beam uses prime editing technology, which utilizes a CRISPR protein to target a mutation site in DNA and to nick a single strand of the target DNA. Guide RNA allows the CRISPR protein to recognize a DNA sequence that is complementary to the guide RNA and also carries a primer for reverse transcription and a replacement template. The reverse transcriptase copies the template sequence in the nicked site, installing the edit. A number of alternative approaches are being developed by others, including, for example, Intellia Therapeutics, Inc. Similarly, another new gene editing technology that has not been discovered yet may be determined to be more attractive than base editing. Moreover, if we decide to develop gene editing technologies other than those involving base editing, we cannot be certain we will be able to obtain rights to such technologies. Any of these factors could reduce or eliminate our commercial opportunity, and could have a material adverse effect on our business, financial condition, results of operations and prospects.

We may not be successful in our efforts to identify and develop potential product candidates. If these efforts are unsuccessful, we may never become a commercial stage company or generate any revenues.

The success of our business depends primarily upon our ability to identify, develop and commercialize product candidates based on our approach to gene editing. All of our product development programs are still in the research or preclinical stage of development and we have not yet completed IND-enabling studies for any product candidate. Our research programs may fail to identify potential product candidates for clinical development for a number of reasons. Our research methodology may be unsuccessful in identifying additional potential product candidates, our potential product candidates may be shown to have harmful side effects in preclinical *in vitro* experiments or animal model studies, they may not show promising signals of therapeutic effect in such experiments or studies or they may have other characteristics that may make the product candidates impractical to manufacture, unmarketable or unlikely to receive marketing approval.

If any of these events occur, we may be forced to abandon our research or development efforts for a program or programs, which would have a material adverse effect on our business, financial condition, results of operations and prospects. Research programs to identify new product candidates require substantial technical, financial and human resources. We may focus our efforts and resources on potential programs or product candidates that ultimately prove to be unsuccessful, which would be costly and time-consuming.

The COVID-19 pandemic may affect our ability to initiate and complete preclinical studies, delay the initiation of future clinical trials, disrupt regulatory activities or have other adverse effects on our business and operations. In addition, this pandemic has adversely impacted economies worldwide, both of which could result in adverse effects on our business, operations and ability to raise capital.

In December 2019, a novel strain of coronavirus, SARS-CoV-2, causing a disease referred to as COVID-19, emerged in China. Since then, COVID-19 has spread to multiple countries worldwide, including the United States. In March 2020, the World Health Organization declared the COVID-19 outbreak a pandemic. The COVID-19 pandemic is causing many governments to implement measures to slow the spread of the outbreak through quarantines, travel restrictions, heightened border scrutiny and other measures. The outbreak and government measures taken in response have also had a significant impact, both direct and indirect, on businesses and commerce, as worker shortages have occurred; supply chains have been disrupted; facilities and production have been suspended; and demand for certain goods and services, such as medical services and supplies, has spiked, while demand for other goods and services, such as travel, has fallen.

The future progression of the outbreak and its effects on our business and operations are uncertain. We and our contract manufacturing organizations, or CMOs, and contract research organizations, or CROs, have experienced a reduction in the capacity to undertake research-scale production and to execute some preclinical studies, and we have faced and may face disruptions that affect our ability to initiate and complete preclinical studies, and disruptions in procuring items that are essential for our research and development activities, including:

- raw materials and supplies used in the production and purification of mRNA nucleic acids as well as lipids used in the production of LNPs;
- raw materials and supplies used in the manufacture of any product candidates we may develop;
- laboratory supplies used in our preclinical studies; and
- animals that are used for preclinical testing for which there are shortages because of ongoing efforts to address the outbreak.

We and our CROs and CMOs may also face disruptions related to our future IND-enabling studies and clinical trials arising from delays in preclinical studies, manufacturing disruptions, and the ability to obtain necessary IRB, IBC or other necessary site approvals, as well as other delays at clinical trial sites.

The response to the COVID-19 pandemic may also redirect resources with respect to regulatory and intellectual property matters in a way that would adversely impact our ability to progress regulatory approvals and protect our intellectual property, for example by causing interruption or delays in the operations of the FDA or other regulatory authorities, which may impact review and approval timelines. We have experienced delays with the FDA as a result of the COVID-19 pandemic. In addition, we may face impediments or delays to regulatory meetings and approvals due to measures intended to limit in-person interactions. The pandemic has already caused significant disruptions in worldwide financial markets, and may continue to cause such disruptions, which could impact our ability to raise additional funds through public offerings and may also impact the volatility of our stock price and trading in our stock. We cannot be certain what the overall impact of the COVID-19 pandemic will be on our business, although for the reasons described above it has the potential to adversely affect our business, financial condition, results of operations and prospects.

Clinical drug development involves a lengthy and expensive process, with an uncertain outcome. If we are ultimately unable to obtain regulatory approval for our product candidates, our business will be substantially harmed.

The risk of failure for each of our product candidates is high. It is impossible to predict when or if any of our product candidates will prove effective or safe in humans or will receive marketing approval. The time required to obtain approval from the FDA, EMA or other comparable foreign regulatory authorities is unpredictable but typically takes many years following the commencement of clinical trials and depends upon numerous factors, including the substantial discretion of regulatory authorities. Before obtaining marketing approval from regulatory authorities for the sale of any product candidate, we must complete preclinical development and then conduct extensive clinical trials to demonstrate the safety and efficacy of our product candidates in humans. We have not yet begun or completed a clinical trial of any product candidate. Clinical trials may fail to demonstrate that our product candidates are safe for humans and effective for indicated uses. Even if initial clinical trials in any of our product candidates we may develop are successful, these product candidates we may develop may fail to show the desired safety and efficacy in later stages of clinical development despite having successfully advanced through preclinical studies and initial clinical trials. There is a high failure rate for drugs and biologics proceeding through clinical trials. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in later stage clinical trials even after achieving promising results in earlier stage clinical trials. Furthermore, even if the clinical trials are successful, changes in marketing approval policies during the development period, changes in or the enactment or promulgation of additional statutes, regulations or guidance or changes in regulatory review for each submitted product application may cause delays in the approval or rejection of an application.

Before we can commence clinical trials for a product candidate, we must complete extensive preclinical testing and studies that support our planned INDs and other regulatory filings in the United States and abroad. We cannot be certain of the timely completion or outcome of our preclinical testing and studies and cannot predict if the outcome of our preclinical testing and studies will ultimately support the further development of our current or future product candidates or whether regulatory authorities will accept our proposed clinical programs. As a result, we may not be able to submit applications to initiate clinical development on the timelines we expect, if at all, and the submission of these applications may not result in regulatory authorities allowing clinical trials to begin. Furthermore, product candidates are subject to continued preclinical safety studies, which may be conducted concurrently with our clinical testing. The outcomes of these safety studies may delay the launch of or enrollment in future clinical trials and could impact our ability to continue to conduct our clinical trials.

Clinical testing is expensive, is difficult to design and implement, can take many years to complete and is uncertain as to outcome. We cannot guarantee that any of our clinical trials will be conducted as planned or completed on schedule, or at all. A failure of one or more clinical trials can occur at any stage of testing, which may result from a multitude of factors, including, but not limited to, flaws in study design, dose selection issues, placebo effects, patient enrollment criteria and failure to demonstrate favorable safety or efficacy traits.

Preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their products. Furthermore, the failure of any of our product candidates to demonstrate safety and efficacy in any clinical trial could negatively impact the perception of our other product candidates and/or cause the FDA, EMA or other regulatory authorities to require additional testing before approving any of our product candidates.

Our current and future product candidates could fail to receive regulatory approval for many reasons, including the following:

- the FDA, EMA or other foreign regulatory authorities may disagree with the design or implementation of our clinical trials;
- we may be unable to demonstrate to the satisfaction of the FDA, EMA or other foreign regulatory authorities that a product candidate is safe, pure and potent or effective for its proposed indication;
- the results of clinical trials may not meet the level of statistical significance required by the FDA, EMA or other foreign regulatory authorities for approval;
- we may be unable to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- the FDA, EMA or other foreign regulatory authorities may disagree with our interpretation of data from clinical trials or preclinical studies;
- the data collected from clinical trials of our product candidates may not be sufficient to support the submission of a Biologics License Application, or BLA, to the FDA, or similar foreign submission to the EMA or other foreign regulatory authority, to obtain approval in the United States, the European Union or elsewhere;
- the FDA, EMA or other foreign regulatory authorities may find deficiencies with or fail to approve the manufacturing processes or facilities of third-party manufacturers with which we contract for clinical and commercial supplies; and
- the approval policies or regulations of the FDA, EMA or other foreign regulatory authorities may significantly change in a manner rendering our clinical data insufficient for approval.

This lengthy approval process as well as the unpredictability of clinical trial results may result in our failing to obtain regulatory approval to market any product candidate we develop, which would significantly harm our business, financial condition, results of operations and prospects.

The FDA, EMA and other comparable foreign regulatory authorities have substantial discretion in the approval process and determining when or whether regulatory approval will be obtained for any product candidate that we develop. Even if we believe the data collected from future clinical trials of our product candidates are promising, such data may not be sufficient to support approval by the FDA, EMA or any other comparable foreign regulatory authorities.

Even if we were to obtain approval, regulatory authorities may approve any of our product candidates for fewer or more limited indications than we request, 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. Additionally, outside of the United States, regulatory authorities may not approve the price we intend to charge for our products. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates.

The outcome of preclinical studies and earlier-stage clinical trials may not be predictive of future results or the success of later preclinical studies and clinical trials.

We are in the early stage of research in the development of our programs and have not conducted any clinical trials. As a result, our belief in the potential capabilities of our programs is based on early research and preclinical studies. However, the results of preclinical studies may not be predictive of the results of later

preclinical studies or clinical trials, and the results of any early-stage clinical trials may not be predictive of the results of later clinical trials. In addition, initial success in clinical trials may not be indicative of results obtained when such trials are completed. Moreover, preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their products. Our future clinical trials may not ultimately be successful or support further clinical development of any product candidates we may develop. There is a high failure rate for product candidates proceeding through clinical trials. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in clinical development even after achieving encouraging results in earlier studies. Any such setbacks in our clinical development could materially harm our business and results of operations.

We may incur unexpected costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of our product candidates.

We may experience numerous unforeseen events during, or as a result of, clinical trials that could delay or prevent our ability to receive marketing approval or commercialize our product candidates, including:

- regulators or institutional review boards, or IRBs, or independent ethics committees may not authorize us or our investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;
- we may experience delays in reaching, or fail to reach, agreement on acceptable clinical trial contracts or clinical trial protocols with prospective trial sites;
- regulators may decide that longer follow-up data are needed before they will consider our marketing application, which would delay our ability to obtain approval;
- regulators may decide the design of our clinical trials is flawed, for example if regulators do not agree with our chosen primary endpoints;
- regulators may decide to slow patient enrollment, resulting in delays to our ability to meet our timelines;
- clinical trials of our product candidates may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical trials or abandon product development programs;
- preclinical testing may produce results based on which we may decide, or regulators may require us, to conduct additional preclinical studies before we proceed with certain clinical trials, limit the scope of our clinical trials, halt ongoing clinical trials or abandon product development programs;
- the number of patients required for clinical trials of our product candidates may be larger than we anticipate, enrollment in these clinical trials may be slower than we anticipate or participants may drop out of these clinical trials at a higher rate than we anticipate;
- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all;
- regulators, IRBs or ethics committees may require us to perform additional or unanticipated clinical trials to obtain approval or we may be subject to additional post-marketing testing requirements to maintain regulatory approval, such as a CVOT;
- regulators may revise the requirements for approving our product candidates, or such requirements may not be as we anticipate;
- the cost of clinical trials of our product candidates may be greater than we anticipate;

- the supply or quality of our product candidates or other materials necessary to conduct clinical trials of our product candidates may be insufficient or inadequate;
- our product candidates may have undesirable side effects or other unexpected characteristics, causing us or our investigators, regulators, IRBs or ethics committees to suspend or terminate the trials; and
- regulators may withdraw their approval of a product or impose restrictions on its distribution, such as in the form of a risk evaluation and mitigation strategy, or REMS.

We could encounter delays if a clinical trial is suspended or terminated by us, by the IRBs of the institutions in which such trials are conducted or their ethics committees, by the data review committee or data safety monitoring board for such trial or by the FDA, EMA or other foreign regulatory authorities. 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, EMA or other foreign regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, including those relating to the class of products to which our product candidates belong.

If we are required to conduct additional clinical trials or other testing of our product candidates beyond those that we currently contemplate, if we are unable to successfully complete clinical trials of our product candidates or other testing, if the results of these trials or tests are not positive or are only modestly positive or if there are safety concerns, we may:

- be delayed in obtaining marketing approval for our product candidates;
- not obtain marketing approval at all;
- obtain approval for indications or patient populations that are not as broad as intended or desired;
- obtain approval with labeling or a REMS that includes significant use or distribution restrictions or safety warnings;
- be subject to additional post-marketing testing requirements; or
- have the product removed from the market after obtaining marketing approval.

Our development costs will also increase if we experience delays in preclinical studies or clinical trials or in obtaining marketing approvals. We do not know whether any of our preclinical studies or clinical trials will begin as planned, will need to be restructured or will be completed on schedule, or at all. We may also determine to change the design or protocol of one or more of our clinical trials, including to add additional patients or arms, which could result in increased costs and expenses and/or delays. Significant preclinical study or clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market before we do and impair our ability to successfully commercialize our product candidates and may harm our business and results of operations.

Preclinical drug development is uncertain. Some or all of our preclinical programs may experience delays or may never advance to clinical trials, which would adversely affect our ability to obtain marketing approvals or commercialize these product candidates on a timely basis or at all, which would have an adverse effect on our business.

In order to obtain FDA approval to market a new biological product, we must demonstrate product purity (or product quality) as well as proof of safety and potency or efficacy in humans. To satisfy these requirements, we will have to conduct adequate and well-controlled clinical trials. Before we can commence clinical trials for a

product candidate, we must complete extensive preclinical testing and studies that support an IND in the United States. We have not yet submitted an IND to the FDA for any of our product candidates. We cannot be certain of the timely completion or outcome of our preclinical testing and studies, and we cannot predict if the FDA will accept our proposed clinical programs or if the outcome of our preclinical testing and studies will ultimately support the further development of these product candidates. As a result, we cannot be sure that we will be able to submit INDs or similar applications for any preclinical programs on the timelines we expect, if at all, and we cannot be sure that submission of INDs or similar applications will result in the FDA or other regulatory authorities allowing clinical trials to begin.

Conducting preclinical testing is a lengthy, time-consuming and expensive process. The length of time may vary substantially according to the type, complexity, novelty and intended use of the product candidate, and often can be several years or more per product candidate. Delays associated with product candidates for which we are conducting preclinical testing and studies ourselves may cause us to incur additional operating expenses. Moreover, we may be affected by delays associated with the preclinical testing and studies of certain product candidates conducted by our potential partners over which we have no control. The commencement and rate of completion of preclinical studies and clinical trials for a product candidate may be delayed by many factors, including, for example:

- inability to generate sufficient preclinical or other *in vivo* or *in vitro* data to support the initiation of clinical trials; and
- delays in reaching a consensus with regulatory agencies on study design.

Moreover, even if we do initiate clinical trials for other product candidates, our development efforts may not be successful, and clinical trials that we conduct or that third parties conduct on our behalf may not demonstrate product purity (or quality) as well as proof of safety and potency or efficacy necessary to obtain the requisite marketing approvals for any of our product candidates or product candidates employing our technology. Even if we obtain positive results from preclinical studies or initial clinical trials, we may not achieve the same success in future trials.

If we experience delays or difficulties in the enrollment of patients in clinical trials, our receipt of necessary regulatory approvals could be delayed or prevented.

Identifying and qualifying patients to participate in clinical trials for our product candidates is critical to our success. Successful and timely completion of clinical trials will require that we enroll a sufficient number of patients who remain in the trial until its conclusion. We may not be able to initiate or continue clinical trials for our product candidates if we are unable to locate and enroll a sufficient number of eligible patients to participate in these trials as required by the FDA or similar regulatory authorities outside of the United States. Given the large patient population for atherosclerotic cardiovascular disease, or ASCVD, if we expand clinical development of VERVE-101 for the treatment of patients with established ASCVD, the number of patients that may be required for clinical trials could be high, we may not be able to enroll a sufficient number of patients and we may not be able to initiate or complete clinical trials of VERVE-101 for the treatment of patients with established ASCVD. Because of the small patient population for homozygous familial hypercholesterolemia, or HoFH, we may have difficulty enrolling patients and we may not be able to initiate or complete clinical trials for our ANGPTL3 program for the treatment of HoFH.

Patient enrollment is affected by a variety of other factors, including:

- the prevalence and severity of the disease under investigation;
- the eligibility criteria for the trial in question;
- the perceived risks and benefits of the product candidate under trial;

- the requirements of the trial protocols, which for products targeting cardiovascular disease, or CVD, could include up to 15 years of long-term patient follow-up;
- the availability of existing treatments for the indications for which we are conducting clinical trials;
- the ability to recruit clinical trial investigators with the appropriate competencies and experience;
- the efforts to facilitate timely enrollment in clinical trials;
- the patient referral practices of physicians;
- the ability to monitor patients adequately during and after treatment;
- the proximity and availability of clinical trial sites for prospective patients;
- perceived negative public perception of gene editing;
- the conduct of clinical trials by competitors for product candidates that treat the same indications or address the same patient populations as our product candidates; and
- the cost to, or lack of adequate compensation for, prospective patients.

Other pharmaceutical and biotechnology companies have reported experiencing delays in enrollment in their ongoing clinical trials as a result of the COVID-19 pandemic, and we could also experience such delays. Our inability to locate and enroll a sufficient number of patients for our clinical trials would result in significant delays, could require us to abandon one or more clinical trials altogether and could delay or prevent our receipt of necessary regulatory approvals. Enrollment delays in our clinical trials may result in increased development costs for our product candidates, which would cause the value of our company to decline and limit our ability to obtain additional financing.

Even if we are able to enroll a sufficient number of patients for our future clinical trials, we may have difficulty maintaining patients in our clinical trials. Many of the patients who end up receiving placebo may perceive that they are not receiving the product candidate being tested, and they may decide to withdraw from our clinical trials to pursue alternative therapies rather than continue the trial. If we have difficulty enrolling or maintaining a sufficient number of patients to conduct our clinical trials, we may need to delay, limit or terminate clinical trials, any of which would harm our business, financial condition, results of operations and prospects.

If any of the product candidates we may develop, or the delivery modes we rely on to administer them, cause serious adverse events, undesirable side effects or unexpected characteristics, such events, side effects or characteristics could delay or prevent regulatory approval of the product candidates, limit the commercial potential or result in significant negative consequences following any potential marketing approval.

We have not evaluated any product candidates in human clinical trials. Moreover, there have been only a limited number of clinical trials involving the use of gene editing technologies and none involving base editing technology similar to our technology. Furthermore, there has not been any gene editing product candidate that has received regulatory approval for use in humans. It is impossible to predict when or if any product candidates we may develop will prove safe in humans. There can be no assurance that gene editing technologies will not cause undesirable side effects, as improper editing of a patient's DNA could lead to lymphoma, leukemia or other cancers or other aberrantly functioning cells.

A significant risk in any gene editing product candidate is that "off-target" edits may occur, which could cause serious adverse events, undesirable side effects or unexpected characteristics. We cannot be certain that off-target editing will not occur in any of our planned or future clinical studies, and the lack of observed side effects in preclinical studies does not guarantee that such side effects will not occur in human clinical studies.

There is also the potential risk of delayed or late presentation of adverse events following exposure to gene editors due to the potential permanence of edits to DNA or due to other components of product candidates used to carry the genetic material. Further, because gene editing makes a permanent change, the therapy cannot be withdrawn, even after a side effect is observed.

We intend to use lipid nanoparticles, or LNPs, to deliver our gene editors to the liver. LNPs have recently been used to deliver mRNA in humans, including the COVID-19 vaccines developed by Pfizer Inc., or Pfizer, and BioNTech SE and by Moderna, Inc., and LNPs are being used to deliver mRNA for therapeutic use in clinical trials. LNPs have the potential to induce liver injury and/or initiate a systemic inflammatory response, either of which could potentially be fatal. While we aim to continue to optimize our LNPs, there can be no assurance that our LNPs will not have undesired effects. Our LNPs could contribute, in whole or in part, to one or more of the following: liver injury, immune reactions, infusion reactions, complement reactions, opsonization reactions, antibody reactions including IgA, IgM, IgE or IgG or some combination thereof, or reactions to the polyethylene glycol, or PEG, from some lipids or PEG otherwise associated with the LNP. Certain aspects of our investigational medicines may induce immune reactions from either the mRNA or the lipid as well as adverse reactions within liver pathways or degradation of the mRNA or the LNP, any of which could lead to significant adverse events in one or more of our future clinical trials. Some of these types of adverse effects have been observed for other LNPs. There may be uncertainty as to the underlying cause of any such adverse event, which would make it difficult to accurately predict side effects in future clinical trials and would result in significant delays in our programs.

If any product candidates we develop are associated with serious adverse events, undesirable side effects or unexpected characteristics, we may need to abandon their development or limit development to certain uses or subpopulations in which the serious adverse events, undesirable side effects or other characteristics are less prevalent, less severe or more acceptable from a risk-benefit perspective, any of which would have a material adverse effect on our business, financial condition, results of operations and prospects.

If in the future we are unable to demonstrate that any of the above adverse events were caused by factors other than our product candidate, the FDA, the EMA or other regulatory authorities could order us to cease further development of, or deny approval of, any product candidates we are able to develop for any or all targeted indications. They could also revoke a marketing authorization if a serious safety concern is identified in any post-marketing follow up studies. Even if we are able to demonstrate that all future serious adverse events are not product-related, such occurrences could affect patient recruitment or the ability of enrolled patients to complete the trial. Moreover, if we elect, or are required, to delay, suspend or terminate any clinical trial of any product candidate we may develop, the commercial prospects of such product candidates may be harmed and our ability to generate product revenues from any of these product candidates may be delayed or eliminated. Any of these occurrences may harm our ability to identify and develop product candidates, and may harm our business, financial condition, result of operations, and prospects significantly.

Adverse public perception of genetic medicines, and gene editing and base editing in particular, may negatively impact regulatory approval of, and/or demand for, our potential products.

Our programs involve editing the human genome. The clinical and commercial success of our product candidates will depend in part on public understanding and acceptance of the use of gene editing therapy for the prevention or treatment of human diseases. Public attitudes may be influenced by claims that gene editing is unsafe, unethical or immoral, and, consequently, our product candidates may not gain the acceptance of the public or the medical community. Adverse public attitudes may adversely impact our ability to enroll clinical trials. Moreover, our success will depend upon physicians prescribing, and their patients being willing to receive, treatments that involve the use of product candidates we may develop in lieu of, or in addition to, existing treatments with which they are already familiar and for which greater clinical data may be available.

In addition, gene editing technology is subject to public debate and heightened regulatory scrutiny due to ethical concerns.

More restrictive government regulations or negative public opinion would have a negative effect on our business or financial condition and may delay or impair our development and commercialization of product candidates or demand for any product candidates we may develop. Adverse events in our preclinical studies or clinical trials or those of our licensors, partners or competitors or of academic researchers utilizing gene editing technologies, even if not ultimately attributable to product candidates we may identify and develop, and the resulting publicity could result in increased governmental regulation, unfavorable public perception, potential regulatory delays in the testing or approval of potential product candidates we may identify and develop, stricter labeling requirements for those product candidates that are approved and a decrease in demand for any such product candidates. Use of gene editing technology by a third party or government to develop biological agents or products that threaten U.S. national security could similarly result in such negative impacts to us.

Interim and preliminary results from our clinical trials that we announce or publish from time to time may change as more participant data become available and are subject to audit and verification procedures, which could result in material changes in the final data.

From time to time, we may publish or report interim or preliminary results from our clinical trials. Interim results from clinical trials that we may complete are subject to the risk that one or more of the clinical outcomes may materially change as participant enrollment continues and more participant 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 evaluate all data. Preliminary or top-line results 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. Adverse differences between preliminary or interim data and final data could be material and could significantly harm our reputation and business prospects and may cause the trading price of our common stock to fluctuate significantly.

Genetic medicines are complex and difficult to manufacture. We could experience delays in satisfying regulatory authorities or production problems that result in delays in our development programs, limit the supply of our product candidates we may develop, or otherwise harm our business.

Any product candidates we may develop will likely require processing steps that are more complex than those required for most chemical pharmaceuticals. Moreover, unlike chemical pharmaceuticals, the physical and chemical properties of a biologic such as the product candidates we intend to develop generally cannot be fully characterized. As a result, assays of the finished product candidate may not be sufficient to ensure that the product candidate will perform in the intended manner. 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 or potentially delay progression of our potential IND filings. If we successfully develop product candidates, we may encounter problems achieving adequate quantities and quality of clinical-grade materials that meet FDA, EMA or other comparable applicable foreign standards or specifications with consistent and acceptable production yields and costs. In addition, the product candidates we may develop will require complicated delivery modalities, such as LNPs, which will introduce additional complexities in the manufacturing process.

In addition, the FDA, the EMA and other 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, the EMA or other 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 harm our business, financial condition, results of operations and prospects.

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

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 that we anticipate will be required in our manufacturing process 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 any product candidates we may develop could adversely impact or disrupt the commercial manufacturing or the production of clinical material, which could materially harm our development timelines and our business, financial condition, results of operations and prospects.

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 and academic research institutions, which could limit our access to additional attractive development programs. Problems in third-party manufacturing process or facilities also could restrict our ability to ensure sufficient clinical material for any clinical trials we may be conducting or are planning to conduct and meet market demand for any product candidates we develop and commercialize.

If any of our product candidates receives marketing approval and we, or others, later discover that the drug is less effective than previously believed or causes undesirable side effects that were not previously identified, our ability to market the drug could be compromised.

Clinical trials of our product candidates are conducted in carefully defined subsets of patients who have agreed to enter into clinical trials. Consequently, it is possible that our clinical trials may indicate an apparent positive effect of a product candidate that is greater than the actual positive effect, if any, or alternatively fail to identify undesirable side effects. If one or more of our product candidates receives regulatory approval, and we, or others, later discover that they are less effective than previously believed, or cause undesirable side effects, a number of potentially significant negative consequences could result, including:

- withdrawal or limitation by regulatory authorities of approvals of such product;
- seizure of the product by regulatory authorities;
- recall of the product;
- restrictions on the marketing of the product or the manufacturing process for any component thereof;
- requirement by regulatory authorities of additional warnings on the label, such as a “black box” warning or contraindication;
- requirement that we implement a REMS or create a medication guide outlining the risks of such side effects for distribution to patients;
- commitment to expensive post-marketing studies as a prerequisite of approval by regulatory authorities of such product;
- the product may become less competitive;

- initiation of regulatory investigations and government enforcement actions;
- initiation of legal action against us to hold us liable for harm caused to patients; and
- harm to our reputation and resulting harm to physician or patient acceptance of our products.

Any of these events could prevent us from achieving or maintaining market acceptance of a particular product candidate, if approved, and could significantly harm our business, financial condition, and results of operations.

We may expend our limited resources to pursue a particular product candidate or indication and fail to capitalize on product candidates or indications that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and managerial resources, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. Failure to allocate resources or capitalize on strategies in a successful manner will have an adverse impact on our business, financial condition and results of operations.

We may conduct clinical trials at sites outside the United States. The FDA may not accept data from trials conducted in such locations, and the conduct of trials outside the United States could subject us to additional delays and expense.

We may conduct one or more of our clinical trials with one or more trial sites that are located outside the United States. Although the FDA may accept data from clinical trials conducted outside the United States, acceptance of these data is subject to conditions imposed by the FDA. For example, the clinical trial must be well designed and conducted and be performed by qualified investigators in accordance with ethical principles. The FDA must be able to validate the data from the trial through an onsite inspection, if necessary. The trial population must also adequately represent the U.S. population, and the data must be applicable to the U.S. population and U.S. medical practice in ways that the FDA deems clinically meaningful. In addition, while these clinical trials are subject to the applicable local laws, whether the FDA accepts the data will depend on its determination that the trials also complied with all applicable U.S. laws and regulations. There can be no assurance that the FDA will accept data from trials conducted outside of the United States. If the FDA does not accept the data from any trial that we conduct outside the United States, it would likely result in the need for additional trials, which would be costly and time-consuming and could delay or permanently halt our development of the applicable product candidates.

In addition, conducting clinical trials outside the United States could have a significant adverse impact on us. Risks inherent in conducting international clinical trials include:

- clinical practice patterns and standards of care that vary widely among countries;
- non-U.S. regulatory authority requirements that could restrict or limit our ability to conduct our clinical trials;
- administrative burdens of conducting clinical trials under multiple non-U.S. regulatory authority schema;
- foreign exchange fluctuations; and
- diminished protection of intellectual property in some countries.

Risks related to our dependence on third parties

We rely, and expect to continue to rely, on third parties to conduct some or all aspects of our product manufacturing, research and preclinical and clinical testing, and these third parties may not perform satisfactorily.

We do not expect to independently conduct all aspects of our product manufacturing, research and preclinical and clinical testing. We currently rely, and expect to continue to rely, on third parties with respect to many of these items, including CMOs for the manufacturing of any product candidates we test in preclinical or clinical development, as well as contract research organizations, or CROs for the conduct of our animal testing and research. Any of these third parties may terminate their engagements with us at any time. If we need to enter into alternative arrangements, it could delay our product development activities. Our reliance on these third parties for research and development activities will reduce our control over these activities but will not relieve us of our responsibility to ensure compliance with all required regulations and study protocols. For example, for product candidates that we develop and commercialize on our own, we will remain responsible for ensuring that each of our IND-enabling studies and clinical trials are conducted in accordance with the study plan and protocols.

Although we intend to design the clinical trials for any product candidates we may develop, CROs will conduct some or all of the clinical trials. As a result, many important aspects of our development programs, including their conduct and timing, will be outside of our direct control. Our reliance on third parties to conduct future preclinical studies and clinical trials will also result in less direct control over the management of data developed through preclinical studies and clinical trials than would be the case if we were relying entirely upon our own staff. Communicating with outside parties can also be challenging, potentially leading to mistakes as well as difficulties in coordinating activities. Outside parties may:

- have staffing difficulties;
- fail to comply with contractual obligations;
- experience regulatory compliance issues;
- undergo changes in priorities or become financially distressed; or
- form relationships with other entities, some of which may be our competitors.

These factors may materially adversely affect the willingness or ability of third parties to conduct our preclinical studies and clinical trials and may subject us to unexpected cost increases that are beyond our control. If the CROs and other third parties do not perform preclinical studies and future clinical trials in a satisfactory manner, breach their obligations to us or fail to comply with regulatory requirements, the development, regulatory approval and commercialization of any product candidates we may develop may be delayed, we may not be able to obtain regulatory approval and commercialize our product candidates or our development programs may be materially and irreversibly harmed. If we are unable to rely on preclinical and clinical data collected by our CROs and other third parties, we could be required to repeat, extend the duration of or increase the size of any preclinical studies or clinical trials we conduct and this could significantly delay commercialization and require greater expenditures.

If third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our studies in accordance with regulatory requirements or our stated study plans and protocols, we will not be able to complete, or may be delayed in completing, the preclinical studies and clinical trials required to support future IND submissions and approval of any product candidates we may develop.

Manufacturing biologic products is complex and subject to product loss for a variety of reasons. We contract with third parties for the manufacture of our product candidates for preclinical and clinical testing and expect to continue to do so for commercialization. This reliance on third parties increases the risk that we will not have sufficient quantities of our product candidates or products or such quantities at an acceptable cost or quality, which could delay, prevent or impair our development or commercialization efforts.

We do not own or operate, and currently have no plans to establish, any manufacturing facilities. We rely, and expect to continue to rely, on third parties for the manufacture of VERVE-101 and our other product candidates for preclinical and clinical testing, as well as for commercial manufacture if any of our product candidates receive marketing approval. We also rely on these third parties for packaging, labeling, sterilization, storage, distribution and other production logistics. This reliance on third parties increases the risk that we will not have sufficient quantities of our product candidates or products or such quantities at an acceptable cost or quality, which could delay, prevent or impair our development or commercialization efforts. We may be unable to establish any agreements with third-party manufacturers or to do so on acceptable terms. Even if we are able to establish agreements with third-party manufacturers, reliance on third-party manufacturers entails additional risks, including:

- reliance on the third party for regulatory compliance and quality assurance;
- the possible breach of the manufacturing agreement by the third party;
- the possible misappropriation of our proprietary information, including our trade secrets and know-how; and
- the possible termination or nonrenewal of the agreement by the third party at a time that is costly or inconvenient for us.

We or our third-party manufacturers may encounter shortages in the raw materials or active pharmaceutical ingredients necessary to produce our product candidates in the quantities needed for our clinical trials or, if our product candidates are approved, in sufficient quantities for commercialization or to meet an increase in demand, as a result of capacity constraints or delays or disruptions in the market for the raw materials or active pharmaceutical ingredients, including shortages caused by the purchase of such raw materials or active pharmaceutical ingredient by our competitors or others. The failure of us or our third-party manufacturers to obtain the raw materials or active pharmaceutical ingredients necessary to manufacture sufficient quantities of our product candidates may have a material adverse effect on our business.

Components of a finished therapeutic product approved for commercial sale or used in late-stage clinical trials must be manufactured in accordance with cGMP. Our third-party manufacturers are subject to inspection and approval by regulatory authorities before we can commence the manufacture and sale of any of our product candidates, and thereafter subject to ongoing inspection from time to time. Third-party manufacturers may not be able to comply with cGMP regulations or similar regulatory requirements outside of the United States. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in regulatory actions, such as the issuance of FDA Form 483 notices of observations, warning letters or sanctions being imposed on us, including clinical holds, fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of product candidates or products, operating restrictions and criminal prosecutions, any of which could significantly and adversely affect supplies of our products.

Manufacturing biologic products, such as VERVE-101, is complex, especially in large quantities. Biologic products must be made consistently and in compliance with a clearly defined manufacturing process. Accordingly, it is essential to be able to validate and control the manufacturing process to assure that it is reproducible. The manufacture of biologics is extremely susceptible to product loss due to contamination, equipment failure or improper installation or operation of equipment, vendor or operator error, inconsistency

in yields, variability in product characteristics and difficulties in scaling the product process. We have not yet scaled up the manufacturing process for any of our product candidates for potential commercialization. Even minor deviations from normal manufacturing processes could result in reduced production yields, product defects and other supply disruptions. If microbial, viral or other contaminations are discovered in our product candidates or in the manufacturing facilities in which our product candidates are made, such manufacturing facilities may need to be closed for an extended period of time to investigate and remedy the contamination, which could harm our results of operations and cause potential reputational damage. Our product candidates and any products that we may develop may compete with other product candidates and products for access to manufacturing facilities. As a result, we may not obtain access to these facilities on a priority basis or at all. There are a limited number of manufacturers that operate under cGMP regulations and that might be capable of manufacturing for us.

Any performance failure on the part of our existing or future manufacturers could delay clinical development or marketing approval. We do not currently have arrangements in place for redundant supply or a source for bulk drug substance nor do we have any agreements with third-party manufacturers for long-term commercial supply. If any of our future contract manufacturers cannot perform as agreed, we may be required to replace such manufacturers. Although we believe that there are several potential alternative manufacturers who could manufacture our product candidates, we may incur added costs and delays in identifying and qualifying any such replacement or be unable to reach agreement with an alternative manufacturer.

Our current and anticipated future dependence upon others for the manufacture of our product candidates or products may adversely affect our future profit margins and our ability to commercialize any products that receive marketing approval on a timely and competitive basis.

If any third-party manufacturer of our product candidates is unable to increase the scale of its production of our product candidates, and/or increase the product yield of its manufacturing, then our costs to manufacture the product candidate may increase and commercialization may be delayed.

In order to produce sufficient quantities to meet the demand for clinical trials and, if approved, subsequent commercialization of any current or future product candidates that we may develop, our third-party manufacturers will be required to increase their production and optimize their manufacturing processes while maintaining the quality of the product. The transition to larger scale production could prove difficult. In addition, if our third-party manufacturers are not able to optimize their manufacturing processes to increase the product yield for our product candidates, or if they are unable to produce increased amounts of our product candidates while maintaining the quality of the product, then we may not be able to meet the demands of clinical trials or market demands, which could decrease our ability to generate profits and have a material adverse impact on our business and results of operation.

We have entered into collaborations, and may enter into additional collaborations, with third parties for the research, development, manufacture and commercialization of programs or product candidates. If these collaborations are not successful, our business could be adversely affected.

As part of our strategy, we have entered into collaborations and intend to seek to enter into additional collaborations with third parties for one or more of our programs or product candidates. For example, in April 2019, we entered into the Beam Agreement to exclusively license certain of Beam's base editing, gene editing and delivery technology against certain cardiovascular targets for use in our product candidates, and in October 2020, we entered into the Acuitas Agreement to license from Acuitas its LNP delivery technology. Our likely collaborators for any other collaboration arrangements include large and mid-size pharmaceutical companies, regional and national pharmaceutical companies and biotechnology companies. We have under the Beam Agreement, and we may have under any other arrangements that we may enter into with any third parties,

limited control over the amount and timing of resources that collaborators dedicate to the development or commercialization of our product candidates. Our ability to generate revenue from these arrangements may depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements.

Collaborations that we enter into may not be successful, and any success will depend heavily on the efforts and activities of such collaborators. Collaborations pose a number of risks, including the following:

- collaborators have significant discretion in determining the amount and timing of efforts and resources that they will apply to these collaborations;
- collaborators may not perform their obligations as expected;
- collaborators may not pursue development of our product candidates or may elect not to continue or renew development programs based on results of clinical trials or other studies, changes in the collaborators' strategic focus or available funding, or external factors, such as an acquisition, that divert resources or create competing priorities;
- collaborators may not pursue commercialization of any product candidates that achieve regulatory approval or may elect not to continue or renew commercialization programs based on results of clinical trials or other studies, changes in the collaborators' strategic focus or available funding, or external factors, such as an acquisition, that may divert resources or create competing priorities;
- collaborators may delay preclinical studies and clinical trials, provide insufficient funding for a preclinical study or clinical trial program, stop a preclinical study or clinical trial or abandon a product candidate, repeat or conduct new preclinical studies or clinical trials or require a new formulation of a product candidate for preclinical or clinical testing;
- we may not have access to, or may be restricted from disclosing, certain information regarding product candidates being developed or commercialized under a collaboration and, consequently, may have limited ability to inform our stockholders about the status of such product candidates on a discretionary basis;
- collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our product candidates and products if the collaborators believe that the competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours;
- product candidates discovered in collaboration with us may be viewed by our collaborators as competitive with their own product candidates or products, which may cause collaborators to cease to devote resources to the commercialization of our product candidates;
- a collaborator may fail to comply with applicable regulatory requirements regarding the development, manufacture, distribution or marketing of a product candidate or product;
- a collaborator with marketing and distribution rights to one or more of our product candidates that achieve regulatory approval may not commit sufficient resources to the marketing and distribution of such product or products;
- disagreements with collaborators, including disagreements over intellectual property or proprietary rights, contract interpretation or the preferred course of development, might cause delays or terminations of the research, development or commercialization of product candidates, might lead to additional responsibilities for us with respect to product candidates, or might result in litigation or arbitration, any of which would be time-consuming and expensive;

- collaborators may not properly obtain, maintain, enforce, defend or protect our intellectual property or proprietary rights or may use our proprietary information in such a way as to potentially lead to disputes or legal proceedings that could jeopardize or invalidate our intellectual property or proprietary information or expose us to potential litigation;
- disputes may arise with respect to the ownership of intellectual property developed pursuant to our collaborations;
- collaborators may infringe, misappropriate or otherwise violate the intellectual property or proprietary rights of third parties, which may expose us to litigation and potential liability; and
- collaborations may be terminated for the convenience of the collaborator, and, if terminated, we could be required to raise additional capital to pursue further development or commercialization of the applicable product candidates.

Collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner, or at all. If any current or future collaborations do not result in the successful development and commercialization of products or if one of our collaborators terminates its agreement with us, we may not receive any future research funding or milestone or royalty payments under the collaboration. If we do not receive the funding we expect under these agreements, our development of our product candidates could be delayed and we may need additional resources to develop our product candidates. All of the risks relating to product development, regulatory approval and commercialization described in this prospectus also apply to the activities of our collaborators.

Collaboration agreements may require us to incur non-recurring and other charges, increase our near- and long-term expenditures, issue securities that dilute our existing stockholders, or disrupt our management and business. For example, upon execution of the Beam Agreement, we issued 276,075 shares of our common stock to Beam. In addition, under the Cas9 License Agreement, we issued 138,037 shares of our common stock to Broad and Harvard. Broad and Harvard also have anti-dilution rights, pursuant to which we have issued Broad and Harvard an additional 309,278 shares of our common stock in the aggregate following the completion of preferred stock financings. We also will issue 878,098 additional shares of common stock to Broad and Harvard upon the closing of this offering pursuant to the Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under “Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College—Issuance of shares in a private placement in connection with this offering.”

We could face significant competition in seeking appropriate collaborators, and the negotiation process is time-consuming and complex. Our ability to reach a definitive collaboration agreement will depend, among other things, upon our assessment of the collaborator’s resources and expertise, the terms and conditions of the proposed collaboration, and the proposed collaborator’s evaluation of several factors. If we license rights to any product candidates we or our collaborators may develop, we may not be able to realize the benefit of such transactions if we are unable to successfully integrate them with our existing operations and company culture.

Additionally, subject to its contractual obligations to us, if a collaborator of ours is involved in a business combination, the collaborator might deemphasize or terminate the development or commercialization of any product candidate licensed to it by us. If one of our collaborators terminates its agreement with us, we may find it more difficult to attract new collaborators and our perception in the business and financial communities could be adversely affected.

If we are not able to establish or maintain collaborations on commercially reasonable terms, we may have to alter our development and commercialization plans and our business could be adversely affected.

We face significant competition in attracting appropriate collaborators, and a number of more established companies may also be pursuing strategies to license or acquire third-party intellectual property rights that we consider attractive. These established companies may have a competitive advantage over us due to their size, financial 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. Whether we reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include the design or results of clinical trials, the likelihood of approval by the FDA, EMA or other regulatory authorities, the potential market for the subject product candidate, the costs and complexities of manufacturing and delivering such product candidate to patients, the potential of competing products, the existence of uncertainty with respect to our ownership of technology, which can exist if there is a challenge to such ownership without regard to the merits of the challenge, the terms of any existing collaboration agreements, and industry and market conditions generally. The collaborator may also have the opportunity to collaborate on other product candidates or technologies for similar indications and will have to evaluate whether such a collaboration could be more attractive than the one with us for our product candidate.

We may also be restricted under existing or future license agreements from entering into agreements on certain terms with potential collaborators.

Collaborations are complex and time-consuming to negotiate, document and execute. In addition, consolidation among large pharmaceutical and biotechnology companies has reduced the number of potential future collaborators.

We may not be able to negotiate additional 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, reduce or delay its development program or one or more of our other development programs, 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 fund and undertake development or commercialization activities on our own, we may need to obtain additional expertise and additional capital, which may not be available to us on acceptable terms or at all. If we fail to enter into collaborations and do not have sufficient funds or expertise to undertake the necessary development and commercialization activities, we may not be able to further develop our product candidates or bring them to market.

We depend on single-source suppliers for some of the components and materials used in our product candidates.

We depend on single-source suppliers for some of the components and materials used in our product candidates. We cannot ensure that these suppliers or service providers will remain in business, have sufficient capacity or supply to meet our needs or that they will not be purchased by one of our competitors or another company that is not interested in continuing to work with us. Our use of single-source suppliers of raw materials, components, key processes and finished goods exposes us to several risks, including disruptions in supply, price increases or late deliveries. There are, in general, relatively few alternative sources of supply for substitute components. These vendors may be unable or unwilling to meet our future demands for our clinical trials or commercial sale. Establishing additional or replacement suppliers for these components, materials and processes could take a substantial amount of time and it may be difficult to establish replacement suppliers

who meet regulatory requirements. Any disruption in supply from any single-source supplier or service provider could lead to supply delays or interruptions, which would damage our business, financial condition, results of operations and prospects.

If we have to switch to a replacement supplier, the manufacture and delivery of any product candidates we may develop could be interrupted for an extended period, which could adversely affect our business. Establishing additional or replacement suppliers, if required, may not be accomplished quickly. If we are able to find a replacement supplier, the replacement supplier would need to be qualified and may require additional regulatory authority approval, which could result in further delay. While we seek to maintain adequate inventory of the single source components and materials used in our products, any interruption or delay in the supply of components or materials, or our inability to obtain components or materials from alternate sources at acceptable prices in a timely manner, could impair our ability to meet the demand for our product candidates.

Risks related to our intellectual property

If we or our licensors are unable to obtain, maintain, defend and enforce patent rights that cover our gene editing technology and product candidates or if the scope of the patent protection obtained is not sufficiently broad, our competitors could develop and commercialize technology and products similar or identical to ours, and our ability to successfully develop and commercialize our technology and product candidates may be adversely affected.

Our success depends in large part on our ability to obtain, maintain, defend, and enforce protection of the intellectual property we may own solely and jointly with others or may license from others, particularly patents, in the United States and other countries with respect to proprietary technology and product candidates we develop. It is difficult and costly to protect our gene editing technologies and product candidates, and we may not be able to ensure their protection. Our ability to stop unauthorized third parties from making, using, selling, offering to sell, importing or otherwise commercializing our product candidates we may develop, or operatively similar products, is dependent upon the extent to which we have rights under valid and enforceable patents or trade secrets that cover these activities.

We seek to protect our proprietary position by filing patent applications in the United States and abroad related to our product candidates that are important to our business and by in-licensing intellectual property related to our technologies and product candidates. If we are unable to obtain or maintain patent protection with respect to any proprietary technology or product candidate, our business, financial condition, results of operations and prospects could be materially harmed. Failure to obtain protection including patent protection, may be a result of specific legal and factual circumstances that may preclude the availability of protection for our product candidates in the United States or any given country. For example, inadequate, faulty or erroneous patent prosecution may result in diminution, loss or unavailability of patent rights that adequately cover our products. Patent disclosures and claims that are intended to cover our product candidates that are sufficient or allowable in one country may not be sufficient or allowable in another country. The requirements for filing a patent application in the United States may not be sufficient to support a patent filing in a country or region outside the United States.

The patent prosecution process is expensive, time-consuming and complex, and we may not be able to file, prosecute, maintain, defend or license all necessary or desirable patent applications at a reasonable cost or in a timely manner. In addition, our ability to obtain and maintain valid and enforceable patents depends on whether the differences between our inventions and the prior art allow our inventions to be patentable over the prior art. 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. Moreover, in some circumstances, we do not have the right to control the preparation, filing and prosecution of patent applications, or to maintain, enforce and

defend the patents, covering technology that we license from third parties. Therefore, these in-licensed patents and applications may not be prepared, filed, prosecuted, maintained, defended and enforced in a manner consistent with the best interests of our business.

The patent position of pharmaceutical and biotechnology companies generally is highly uncertain, involves complex legal and factual questions and has in recent years been the subject of much litigation. The field of gene editing especially has been the subject of extensive patenting activity and litigation. In addition, the scope of patent protection outside of the United States is uncertain and laws of foreign countries may not protect our rights to the same extent as the laws of the United States or vice versa. For example, European patent law restricts the patentability of methods of treatment of the human body more than United States law does.

With respect to both owned and in-licensed patent rights, we cannot predict whether the patent applications we and our licensors are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient protection from competitors. Further, we may not be aware of all third-party intellectual property rights potentially relating to our product candidates.

In addition, publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing, or in some cases not published at all. Therefore, neither we nor our licensors can know with certainty whether either we or our licensors were the first to make the inventions claimed in the patents and patent applications we own or in-license now or in the future, or that either we or our licensors were the first to file for patent protection of such inventions. As a result, the issuance, scope, validity, enforceability and commercial value of our owned and in-licensed patent rights are highly uncertain. Moreover, our owned and in-licensed pending and future patent applications may not result in patents being issued which protect our technology and product candidates, in whole or in part, or which effectively prevent others from commercializing competitive technologies and products. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our patents and our ability to obtain, protect, maintain, defend and enforce our patent rights, narrow the scope of our patent protection and, more generally, could affect the value or narrow the scope of our patent rights.

Moreover, we or our licensors may be subject to a third-party preissuance submission of prior art to the United States Patent and Trademark Office, or USPTO, or become involved in opposition, derivation, revocation, reexamination, *inter partes* review, post-grant 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 of, or invalidate, our patent rights, allow third parties to commercialize our technology or product candidates and compete directly with us, without payment to us, or result in our inability to manufacture or commercialize drugs without infringing third-party patent rights. If the breadth or strength of protection provided by our patents and patent applications is threatened, regardless of the outcome, it could dissuade companies from collaborating with us to license, develop or commercialize current or future product candidates.

Additionally, the coverage claimed in a patent application can be significantly reduced before the patent is issued, and its scope can be reinterpreted after issuance. Even if our owned and in-licensed patent applications issue as patents, they may not issue in a form that will provide us with any meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, and our owned and in-licensed patents may be challenged in the courts or patent offices in the United States and abroad. 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 technology and products, or limit the duration of the patent protection of our technology

and product candidates. Such proceedings also may result in substantial cost and require significant time from our management and employees, even if the eventual outcome is favorable to us. 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. Furthermore, our competitors may be able to circumvent our owned or in-licensed patents by developing similar or alternative technologies or products in a non-infringing manner. As a result, our owned and in-licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing technology and products similar or identical to any of our technology and product candidates.

Our rights to develop and commercialize our gene editing technology and product candidates are subject, in part, to the terms and conditions of licenses granted to us by others.

We depend on intellectual property licensed from third parties, and our licensors may not always act in our best interest. If we fail to comply with our obligations under our intellectual property licenses, if the licenses are terminated, or if disputes regarding these licenses arise, we could lose significant rights that are important to our business.

We have licensed and are dependent on certain patent rights and proprietary technology from third parties that are important or necessary to the development of our gene editing technology and product candidates. For example, we are a party to the Beam Agreement, the Cas9 License Agreement, the Acuitas Agreement and other license agreements, pursuant to which we in-license key patents and patent applications for our gene editing technology, LNP technology and product candidates. These license agreements impose various diligence, milestone payment, royalty, insurance and other obligations on us. If we fail to comply with these obligations, our licensors may have the right to terminate our license, in which event we would not be able to develop or market our gene editing technology or product candidates covered by the intellectual property licensed under these agreements. For more information regarding these agreements, please see “Business—Intellectual property licenses.”

These and other licenses may not provide exclusive rights to use such intellectual property and technology in all relevant fields of use and in all territories in which we may wish to develop or commercialize our gene editing technology and product candidates in the future. Some licenses granted to us are expressly subject to certain preexisting rights held by the licensor or certain third parties. As a result, we may not be able to prevent competitors from developing and commercializing competitive products in certain territories or fields. If we determine that rights to such excluded fields are necessary to commercialize our product candidates or maintain our competitive advantage, we may need to obtain a license from such third party in order to continue developing, manufacturing or marketing our product candidates. We may not be able to obtain such a license on an exclusive basis, on commercially reasonable terms, or at all, which could prevent us from commercializing our product candidates or allow our competitors or others the chance to access technology that is important to our business.

In addition, pursuant to the Cas9 License Agreement, under certain specific circumstances, Harvard and Broad may grant a license to the patents that are the subject of such license agreements to a third party in the same field as such patents are licensed to us. Such third party may then have full rights that are the subject of the Cas9 License Agreement, which could impact our competitive position and enable a third party to commercialize products similar to our potential future product candidates and technology. Any grant of rights to a third party in this scenario would narrow the scope of our exclusive rights to the patents and patent applications we have in-licensed from Harvard and Broad.

We do not have complete control in the preparation, filing, prosecution, maintenance, enforcement and defense of patents and patent applications covering the technology that we license from third parties. It is possible that our licensors’ enforcement of patents against infringers or defense of such patents against challenges of

validity or claims of enforceability may be less vigorous than if we had conducted them ourselves, or may not be conducted in accordance with our best interests. We cannot be certain that these patents and patent applications will be prepared, filed, prosecuted, maintained, enforced and defended in a manner consistent with the best interests of our business. If our licensors fail to prosecute, maintain, enforce and defend such patents, or lose rights to those patents or patent applications, the rights we have licensed may be reduced or eliminated, our right to develop and commercialize any of our product candidates we may develop that are the subject of such licensed rights could be adversely affected and we may not be able to prevent competitors from making, using and selling competing products.

Our licensors may have relied on third-party consultants or collaborators or on funds from third parties such that our licensors are not the sole and exclusive owners of the patents we in-licensed. If other third parties have ownership rights to our in-licensed patents, the license granted to us in jurisdictions where the consent of a co-owner is necessary to grant such a license may not be valid and such co-owners may be able to license such patents to our competitors, and our competitors could market competing products and technology. In addition, our rights to our in-licensed patents and patent applications are dependent, in part, on inter-institutional or other operating agreements between the joint owners of such in-licensed patents and patent applications. If one or more of such joint owners breaches such inter-institutional or operating agreements, our rights to such in-licensed patents and patent applications may be adversely affected. Any of these events could have a material adverse effect on our competitive position, business, financial conditions, results of operations and prospects.

Furthermore, inventions contained within some of our in-licensed patents and patent applications were made using U.S. government funding. We rely on our licensors to ensure compliance with applicable obligations arising from such funding, such as timely reporting, an obligation associated with our in-licensed patents and patent applications. The failure of our licensors to meet their obligations may lead to a loss of rights or the unenforceability of relevant patents. For example, the U.S. government could have certain rights in such in-licensed patents, including a non-exclusive license authorizing the U.S. government to use the invention or to have others use the invention on its behalf. If the U.S. government decides to exercise these rights, it is not required to engage us as its contractor in connection with doing so. The U.S. government's rights may also permit it to disclose the funded inventions and technology to third parties and to exercise march-in rights to use or allow third parties to use the technology we have licensed that was developed using U.S. government funding. The U.S. government may also exercise its march-in rights if it determines that action is necessary because we or our licensors failed to achieve practical application of the U.S. 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 in-licensed U.S. government-funded inventions may be subject to certain requirements to manufacture product candidates embodying such inventions in the United States. Any of the foregoing could harm our business, financial condition, results of operations and prospects significantly.

In the event any of our third-party licensors determine that, in spite of our efforts, we have materially breached a license agreement or have failed to meet certain obligations thereunder, it may elect to terminate the applicable license agreement or, in some cases, one or more license(s) under the applicable license agreement, and such termination would result in us no longer having the ability to develop and commercialize product candidates and technology covered by that license agreement or license. In the event of such termination of a third-party in-license, or if the underlying patents under a third-party in-license fail to provide the intended exclusivity, competitors would have the freedom to seek regulatory approval of, and to market, products identical to ours. Any of these events could have a material adverse effect on our competitive position, business, financial conditions, results of operations and prospects.

Our owned patent applications and in-licensed patents and patent applications and other intellectual property may be subject to priority or inventorship disputes, interferences and similar proceedings. If we or our licensors are unsuccessful in any of these proceedings, we may be required to obtain licenses from third parties, which may not be available on commercially reasonable terms or at all, or to cease the development, manufacture, and commercialization of one or more of the product candidates we may develop, which could have a material adverse impact on our business.

Certain of the U.S. patents and one U.S. patent application to which we hold an option are co-owned by Broad and MIT, and in some cases co-owned by Broad, MIT and Harvard, which we refer to together as the Boston Licensing Parties, and were involved in U.S. Interference No. 106,048 with one U.S. patent application co-owned by the University of California, the University of Vienna, and Emmanuelle Charpentier, which we refer to together as CVC. On September 10, 2018, the Court of Appeals for the Federal Circuit, or the CAFC, affirmed the Patent Trial and Appeal Board of the USPTO's, or PTAB's, holding that there was no interference-in-fact. An interference is a proceeding within the USPTO to determine priority of invention of the subject matter of patent claims filed by different parties.

On June 24, 2019, the PTAB declared an interference (U.S. Interference No. 106,115) between 10 U.S. patent applications that are co-owned by CVC, and 13 U.S. patents and one U.S. patent application (that are co-owned by the Boston Licensing Parties). In the declared interference, CVC has been designated as the junior party and the Boston Licensing Parties have been designated as the senior party.

On December 20, 2020, the PTAB declared an interference (U.S. Interference No. 106,126) between one U.S. patent application owned by Toolgen, Inc. and 14 U.S. patents and two U.S. patent applications that are co-owned by the Boston Licensing Parties. In the declared interference, Boston Licensing Parties have been designated as the junior party and Toolgen, Inc. has been designated as the senior party.

As a result of the declaration of interference, an adversarial proceeding in the USPTO before the PTAB has been initiated, which is declared to ultimately determine priority, specifically and which party was first to invent the claimed subject matter. An interference is typically divided into two phases. The first phase is referred to as the motions or preliminary motions phase while the second is referred to as the priority phase. In the first phase, each party may raise issues including but not limited to those relating to the patentability of a party's claims based on prior art, written description, and enablement. A party also may seek an earlier priority benefit or may challenge whether the declaration of interference was proper in the first place. Priority, or a determination of who first invented the commonly claimed invention, is determined in the second phase of an interference. Although we cannot predict with any certainty how long each phase will actually take, each phase may take approximately a year or longer before a decision is made by the PTAB. It is possible for motions filed in the preliminary motions phase to be dispositive of the interference proceeding, such that the second priority phase is not reached.

There can be no assurance that the U.S. interference will be resolved in favor of the Boston Licensing Parties. If the 106,115 or 106,126 interference resolves in favor of CVC or Toolgen, Inc. respectively, or if the Boston Licensing Parties' patents and patent application are narrowed, invalidated, or held unenforceable, we will lose the ability to license the optioned patents and patent application and our ability to commercialize our product candidates may be adversely affected if we cannot obtain a license to relevant third-party patents that cover our product candidates. We may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be nonexclusive, thereby giving our competitors and other third parties access to the same technologies licensed to us, and it could require us to make substantial licensing and royalty payments. If we are unable to obtain a necessary license to a third-party patent on commercially reasonable terms, we may be unable to commercialize our gene editing technology or product candidates or such commercialization efforts may be significantly delayed, which could in turn significantly harm our business.

We or our licensors may also be subject to claims that former employees, collaborators, or other third parties have an interest in our owned patent applications or in-licensed patents or patent applications or other intellectual property as an inventor or co-inventor. If we are unable to obtain an exclusive license to any such third-party co-owners' interest in such patent applications, such co-owners rights may be subject, or in the future subject, to assignment or license to other third parties, including our competitors. In addition, we may need the cooperation of any such co-owners to enforce any patents that issue from such patent applications against third parties, and such cooperation may not be provided to us.

If we or our licensors are unsuccessful in any interference proceedings or other priority, validity (including any patent oppositions) or inventorship disputes to which we or they are subject, we may lose valuable intellectual property rights through the loss of one or more of our owned, licensed or optioned patents, or such patent claims may be narrowed, invalidated or held unenforceable, or through loss of exclusive ownership of or the exclusive right to use our owned or in-licensed patents. In the event of loss of patent rights as a result of any of these disputes, we may be required to obtain and maintain licenses from third parties, including parties involved in any such interference proceedings or other priority or inventorship disputes. Such licenses may not be available on commercially reasonable terms or at all, or may be non-exclusive. If we are unable to obtain and maintain such licenses, we may need to cease the development, manufacture and commercialization of one or more of the product candidates we may develop. The loss of exclusivity or the narrowing of our patent claims could limit our ability to stop others from using or commercializing similar or identical technology and product candidates. Even if we or our licensors are successful in an interference proceeding, other similar priority disputes, or inventorship or ownership disputes, it could result in substantial costs and be a distraction to management and other employees. Any of the foregoing could result in a material adverse effect on our business, financial condition, results of operations or prospects.

If we fail to comply with our obligations in our intellectual property licenses arrangements with third parties, or otherwise experience disruptions to our business relationships with our licensors, we could lose intellectual property rights that are important to our business.

We are party to agreements, and we may enter into additional arrangements, with third parties that may impose diligence, development and commercialization timelines, milestone payment, royalty, insurance and other obligations on us. We have existing agreements, pursuant to which we are obligated to pay royalties on net product sales of product candidates or related technologies to the extent they are covered by the agreements. If we fail to comply with such obligations under current or future agreements, our counterparties may have the right to terminate these agreements or require us to grant them certain rights. Such an occurrence could materially adversely affect the value of any product candidate being developed under any such agreement. Termination of these agreements or reduction or elimination of our rights under these agreements may result in our having to negotiate new or reinstated agreements with less favorable terms, or cause us to lose our rights under these agreements, including our rights to important intellectual property or technology, which would have a material adverse effect on our business, financial condition, results of operations and prospects. While we still face all of the risks described herein with respect to those agreements, we cannot prevent third parties from also accessing those technologies. In addition, our licenses may place restrictions on our future business opportunities.

Disputes may arise regarding intellectual property subject to a licensing agreement, including:

- the scope of rights granted under the agreement and other interpretation related issues;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- the sublicensing of patent and other rights under our collaborative development relationships;

- our diligence obligations under the agreement and what activities satisfy those diligence obligations;
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our partners; and
- the priority of invention of patented technology.

In addition, the agreements under which we currently license intellectual property or technology from third parties are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement, either of which could have a material adverse effect on our business, financial condition, results of operations and prospects. Moreover, if disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on commercially acceptable terms, we may be unable to successfully develop and commercialize the affected technology and product candidates, which could have a material adverse effect on our business, financial conditions, results of operations and prospects.

Our current or future licensors may have relied on third-party consultants or collaborators or on funds from third parties such that our licensors are not the sole and exclusive owners of the intellectual property or intellectual property rights we in-license. If other third parties have ownership rights to intellectual property or intellectual property rights we in-license, they may be able to license such intellectual property or intellectual property rights to our competitors, and our competitors could market competing products and technology. This could have a material adverse effect on our competitive position, business, financial conditions, results of operations and prospects.

In spite of our best efforts, our licensors might conclude that we have materially breached our license agreements and might therefore terminate the license agreements, thereby removing our ability to develop and commercialize product candidates and technology covered by these license agreements. If these in-licenses are terminated, or if the underlying intellectual property fails to provide the intended exclusivity, competitors would have the freedom to seek regulatory approval of, and to market, products and technologies identical to ours. This could have a material adverse effect on our competitive position, business, financial condition, results of operations and prospects.

If we are unable to obtain licenses from third parties on commercially reasonable terms or fail to comply with our obligations under such agreements, our business could be harmed.

We currently have rights to intellectual property, through licenses from third parties, to identify and develop product candidates, and we expect to seek to expand our product candidate pipeline in part by in-licensing the rights to key technologies. Although we have succeeded in licensing technologies from third-party licensors including Harvard, Broad, Beam, and Acuitas in the past, we cannot assure you that we will be able to in-license or acquire the rights to any product candidates or technologies from third parties on acceptable terms or at all.

Various third parties practice in competitive technology areas and may have issued patents or patent applications that will issue as patents in the future, which could impede or preclude our ability to commercialize our product candidates. For any third-party patents that could be relevant to our product candidates, we rely in part on the “safe harbor” or research exemption under 35 U.S.C. § 271(e)(1), which exempts from patent infringement activities related to pursuing FDA approval for a drug product. However, while U.S. patent law provides such a “safe harbor” to our clinical product candidates under this provision, that exemption expires when an IND or BLA is submitted. Given the uncertainty of clinical trials, we cannot be certain of the timing of their completion and it is possible that we may submit a BLA for one of our product candidates at a time when one or more relevant third-party patents is in force.

It may therefore be necessary for us to use the patented or proprietary technology of third parties to commercialize our products, in which case we would be required to obtain a license from these third parties. If we are unable to license such technology, or if we are forced to license such technology on unfavorable terms, our business could be materially harmed. If we are unable to obtain a necessary license, we may be unable to develop or commercialize the affected product candidates, which could materially harm our business and the third parties owning such intellectual property rights could seek either an injunction prohibiting our sales or an obligation on our part to pay royalties and/or other forms of compensation. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us.

Furthermore, there has been extensive patenting activity in the field of gene editing, and pharmaceutical companies, biotechnology companies, and academic institutions are competing with us or are expected to compete with us in the in the field of gene editing technology and filing patent applications potentially relevant to our business, and there may be third-party patent applications that, if issued, may allow the third party to circumvent our patent rights. Because of the large number of patents issued and patent applications filed in our field, these and other third parties could allege they have patent rights encompassing our product candidates, technologies or methods. In order to market our product candidates, we may find it necessary or prudent to obtain licenses from such third-party intellectual property holders. However, we may be unable to secure such licenses or otherwise acquire or in-license any compositions, methods of use, processes, or other intellectual property rights from third parties that we identify as necessary for product candidates and gene editing technology we may develop. We may also require licenses from third parties for certain gene editing technologies including certain delivery and gene editing compositions and methods that we are evaluating, or may in the future evaluate, for use with product candidates we may develop. In addition, some of our owned patent applications and in-licensed patents and patent applications may be determined to be co-owned with third parties. With respect to any patents co-owned with third parties, we may require licenses to such co-owners' interest to such patents. If we are unable to obtain an exclusive license to any such third-party co-owners' interest in such patents or patent applications, such co-owners may be able to license their rights to other third parties, including our competitors, and our competitors could market competing products and technology. In addition, we may need the cooperation of any such co-owners of our patents in order to enforce such patents against third parties, and such cooperation may not be provided to us.

Additionally, we may collaborate with academic institutions to accelerate our preclinical research or development under written agreements with these institutions. In certain cases, these institutions provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the collaboration. Even if we hold such an option, we may be unable to negotiate a license from the institution 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 others, potentially blocking our ability to pursue our program.

In addition, the licensing or acquisition of third-party intellectual property rights is a highly 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 or necessary. These established companies may have a competitive advantage over us due to their size, capital 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 or at all. 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 the relevant program or product candidate, which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

If we are unable to obtain rights to required third-party intellectual property rights or maintain the existing intellectual property rights we have, we may be required to expend significant time and resources to redesign our technology, product candidates, or the methods for manufacturing them or to develop or license replacement technology, all of which may not be feasible on a technical or commercial basis. If we are unable to do so, we may be unable to develop or commercialize the affected technology and product candidates, which could harm our business, financial condition, results of operations and prospects significantly.

Additionally, if we fail to comply with our obligations under license agreements, our counterparties may have the right to terminate these agreements, in which event we might not be able to develop, manufacture or market, or may be forced to cease developing, manufacturing or marketing, any product that is covered by these agreements or may face other penalties under such agreements. Such an occurrence could materially adversely affect the value of the product candidate being developed under any such agreement. Termination of these agreements or reduction or elimination of our rights under these agreements, or restrictions on our ability to freely assign or sublicense our rights under such agreements when it is in the interest of our business to do so, may result in our having to negotiate new or reinstated agreements with less favorable terms, cause us to lose our rights under these agreements, including our rights to important intellectual property or technology or impede, or delay or prohibit the further development or commercialization of one or more product candidates that rely on such agreements.

The intellectual property landscape around genome editing technology, including base editing, is highly dynamic, and third parties may initiate legal proceedings alleging that we are infringing, misappropriating, or otherwise violating their intellectual property rights, the outcome of which would be uncertain and may prevent, delay or otherwise interfere with our product discovery and development efforts.

Our commercial success depends upon our ability and the ability of our collaborators to research, develop, manufacture, market and sell our product candidates and use our proprietary technologies without infringing, misappropriating or otherwise violating the intellectual property rights of third parties. The field of genome editing, especially in the area of base editing technology, is still in its infancy, and no such product candidates have reached the market. Due to the intense research and development that is taking place by several companies, including us and our competitors, in this field, the intellectual property landscape is evolving and in flux, and it may remain uncertain for the coming years. The biotechnology and pharmaceutical industries are characterized by extensive and complex litigation regarding patents and other intellectual property rights as well as administrative proceedings for challenging patents, including interference, derivation, *inter partes* review, post grant review, and reexamination proceedings before the USPTO or oppositions and other comparable proceedings in foreign jurisdictions. There may be significant intellectual property related litigation and proceedings relating to our owned and in-licensed, and other third party, intellectual property and proprietary rights in the future. We may be subject to and may in the future become party to, or threatened with, adversarial proceedings or litigation regarding intellectual property rights with respect to our gene editing platform technology and any product candidates we may develop, including interference proceedings, post-grant review, *inter partes* review, and derivation proceedings before the USPTO and similar proceedings in foreign jurisdictions such as oppositions before the European Patent Office. Numerous U.S. and foreign issued patents and pending patent applications that are owned by third parties exist in the fields in which we are developing our product candidates and they may assert infringement claims against us based on existing patents or patents that may be granted in the future, regardless of their merit.

As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our gene editing technology and product candidates may give rise to claims of infringement of the patent rights of others. Moreover, it is not always clear to industry participants, including us, which patents cover various types of therapies, products or their methods of use or manufacture. We are aware of certain third-party patent applications that, if issued, may be construed to cover our gene editing technology and product

candidates. There may also be third-party patents of which we are currently unaware with claims to technologies, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. 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, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents.

It is possible that we have failed to identify relevant third-party patents or applications that our product candidates and programs may infringe. Because patent applications can take many years to issue, may be confidential for 18 months or more after filing and can be revised before issuance, there may be applications now pending which may later result in issued patents that may be infringed by the manufacture, use, sale or importation of any product candidates we may develop or our technology, and we may not be aware of such patents. Furthermore, applications filed before November 29, 2000 and certain applications filed after that date that will not be filed outside the United States may remain confidential until a patent issues. Moreover, it is difficult for industry participants, including us, to identify all third-party patent rights that may be relevant to any product candidates we may develop and our technologies because patent searching is imperfect due to differences in terminology among patents, incomplete databases and the difficulty in assessing the meaning of patent claims. We may fail to identify relevant patents or patent applications or may identify pending patent applications of potential interest but incorrectly predict the likelihood that such patent applications may issue with claims of relevance to our technology. In addition, we may incorrectly conclude that a third-party patent is invalid, unenforceable or not infringed by our activities. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our technologies, any product candidates we may develop or the use of any product candidates we may develop.

Third parties may assert infringement claims against us based on existing patents or patents that may be granted in the future, regardless of their merit. There is a risk that third parties may choose to engage in litigation with us to enforce or to otherwise assert their patent rights against us. Even if we believe such claims are without merit, a court of competent jurisdiction could hold that these third-party patents are valid, enforceable and infringed, which could adversely affect our ability to commercialize our product candidates or any other of our product candidates or technologies covered by the asserted third-party patents. In order to successfully challenge the validity of any such U.S. patent in federal court, we would need to overcome a presumption of validity. As this burden is a high one requiring us to present clear and convincing evidence as to the invalidity of any such U.S. patent claim, there is no assurance that a court of competent jurisdiction would invalidate the claims of any such U.S. patent.

Numerous third-party U.S. and foreign issued patents and pending patent applications exist in the fields in which we are developing product candidates. Our product candidates make use of CRISPR-based gene editing technology, which is a field that is highly active for patent filings. The extensive patent filings related to CRISPR and Cas make it difficult for us to assess the full extent of relevant patents and pending applications that may cover our gene editing technology and product candidates and their use or manufacture. There may be third-party patents or patent applications, including patents held or controlled by our competitors with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our gene editing technology and product candidates.

If we are found to infringe, misappropriate or otherwise violate a third party's valid and enforceable intellectual property rights, we could be required to obtain a license from such third party to continue developing, manufacturing and marketing our product candidates and technology. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors and other third parties access to the same technologies licensed to us, and it could require us to make substantial licensing and royalty payments. We could be forced, including by

court order, to cease developing, manufacturing and commercializing the infringing technology or product candidates. In addition, we could be found liable for monetary damages, including treble damages and attorneys' fees, if we are found to have willfully infringed a patent or other intellectual property right indemnify our customers or collaborators. A finding of infringement could prevent us from manufacturing and commercializing our product candidates or force us to cease some of our business operations, which could harm our business. Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar negative impact on our business, financial condition, results of operations and prospects.

Patent terms may be inadequate to protect our competitive position on our product candidates for an adequate amount of time.

Patents have a limited lifespan. The terms of individual patents depend upon the legal term for patents in the countries in which they are granted. In most countries, including the United States, if all maintenance fees are timely paid, the natural expiration of a patent is generally 20 years from its earliest non-provisional filing date in the applicable country. However, the actual protection afforded by a patent varies 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. Various extensions may be available, but the life of a patent, and the protection it affords, is limited. Even if patents covering our product candidates are obtained, once the patent life has expired, we may be open to competition from competitive products, including biosimilars. 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 owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

Our product candidates may face competition from biosimilars approved through an abbreviated regulatory pathway.

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the ACA, includes a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-approved reference biological product. 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 approved 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 approved. 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 the sponsor's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of the other company's product. The law is complex and is still being interpreted and implemented by the FDA. As a result, its ultimate impact, implementation, and meaning are subject to uncertainty.

We believe that any of our product candidates approved as a biological product under a BLA should qualify for the 12-year period of exclusivity. However, there is a risk that this exclusivity could be shortened due to Congressional action or otherwise, or that the FDA will not consider our product candidates to be reference products for competing products, potentially creating the opportunity for biosimilar competition sooner than anticipated. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. Moreover, the extent to which a biosimilar, once approved, will be substituted for any one of our reference products in a way that is similar to traditional generic substitution for non-biological products is not yet clear, and will depend on a number of marketplace and regulatory factors that are still developing.

If we do not obtain patent term extension in the United States under the Hatch-Waxman Act and in foreign countries under similar legislation, thereby potentially extending the term of our marketing exclusivity for any product candidates we may develop, our business may be materially harmed.

In the United States, the patent term of a patent that covers an FDA-approved drug may be eligible for limited patent term extension, which permits patent term restoration as compensation for the patent term lost during the FDA regulatory review process. The Drug Price Competition and Patent Term Restoration Act of 1984, also known as the Hatch-Waxman Act, permits a patent term extension of up to five years beyond the expiration of the patent. The length of the patent term extension is related to the length of time the drug is under clinical development and regulatory review. Patent extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval, and only one patent applicable to and that covers an approved drug may be extended. Similar provisions are available in Europe, such as supplementary protection certificates, and certain other non-United States jurisdictions to extend the term of a patent that covers an approved drug. While, in the future, if and when our product candidates receive FDA approval, we expect to apply for patent term extensions on patents covering those product candidates, there is no guarantee that the applicable authorities will agree with our assessment of whether such extensions should be granted, and even if granted, the length of such extensions. We may not be granted patent term extension either in the United States or in any foreign country because of, for example, failing to exercise due diligence during the testing phase or regulatory review process, failing to apply within applicable deadlines, failing to apply prior to expiration of relevant patents or otherwise failing to satisfy applicable requirements. Moreover, the term of extension, as well as the scope of patent protection during any such extension, afforded by the governmental authority could be less than we request. If we are unable to obtain any patent term extension or the term of any such extension is less than we request, our competitors may obtain approval of competing products following the expiration of our patent rights, and our business, financial condition, results of operations and prospects could be materially harmed.

It is possible that we will not obtain patent term extension under the Hatch-Waxman Act for a U.S. patent covering any of our product candidates that we may identify even where that patent is eligible for patent term extension, or if we obtain such an extension, it may be for a shorter period than we had sought.

Changes to patent laws in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our gene editing platform technology and product candidates.

As is the case with other biotech and pharmaceutical companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biopharmaceutical industry involve both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain.

Changes in either the patent laws or interpretation of patent laws in the United States, including patent reform legislation such as the Leahy-Smith America Invents Act, or the Leahy-Smith Act, could increase the uncertainties and costs surrounding the prosecution of our owned and in-licensed patent applications and the maintenance, enforcement or defense of our owned and in-licensed issued patents. The Leahy-Smith Act includes a number of significant changes to United States patent law. These changes include provisions that affect the way patent applications are prosecuted, redefine prior art, provide more efficient and cost-effective avenues for competitors to challenge the validity of patents, and enable third-party submission of prior art to the USPTO during patent prosecution and additional procedures to attack the validity of a patent at USPTO-administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in United States federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same

evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action.

Assuming that other requirements for patentability are met, prior to March 2013, in the United States, the first to invent the claimed invention was entitled to the patent, while outside the United States, the first to file a patent application was entitled to the patent. After March 2013, under the Leahy-Smith Act, the United States transitioned to a first-to-file system in which, assuming that the other statutory requirements for patentability are met, the first inventor to file a patent application will be entitled to the patent on an invention regardless of whether a third party was the first to invent the claimed invention. As such, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, the patent positions of companies in the development and commercialization of biologics and pharmaceuticals are particularly uncertain. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. This combination of events has created uncertainty with respect to the validity and enforceability of patents once obtained. Depending on future actions by the U.S. Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that could have a material adverse effect on our patent rights and our ability to protect, defend and enforce our patent rights in the future. For example, in the case, *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.,* the U.S. Supreme Court held that claims to certain DNA molecules are not patentable. More recently, in *Amgen Inc. v. Sanofi*, the Federal Circuit held that claims with functional language may pose high hurdles in fulfilling the enablement requirement for claims with broad functional language. We cannot predict how this and future decisions by the courts, the U.S. Congress or the USPTO may impact the value of our patents. Any similar adverse changes in the patent laws of other jurisdictions could also have a material adverse effect on our business, financial condition, results of operations and prospects.

Issued patents covering our product candidates could be found invalid or unenforceable if challenged in court. We may not be able to protect our trade secrets in court.

If we or one of our licensing partners initiates legal proceedings against a third party to enforce a patent covering one of our product candidates, the defendant could counterclaim that the patent covering our product candidate is invalid or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness, written description or non-enablement. In addition, patent validity challenges may, under certain circumstances, be based upon non-statutory obviousness-type double patenting, which, if successful, could result in a finding that the claims are invalid for obviousness-type double patenting or the loss of patent term, including a patent term adjustment granted by the USPTO, if a terminal disclaimer is filed to obviate a finding of obviousness-type double patenting. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld information material to patentability from the USPTO, or made a misleading statement, during prosecution. Third parties also may raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include re-examination, post grant review, *inter partes* review and equivalent proceedings in foreign jurisdictions. Such proceedings could result in the revocation or cancellation of or amendment to our patents in such a way that they no longer cover our product candidates. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art of which the patent examiner and we or our licensing partners

were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we could lose at least part, and perhaps all, of the patent protection on one or more of our product candidates. Such a loss of patent protection could have a material adverse impact on our business.

In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable or that we elect not to patent, processes for which patents are difficult to enforce and any other elements of our product candidate discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. However, trade secrets can be difficult to protect, and some courts inside and outside the United States are less willing or unwilling to protect trade secrets. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our employees, consultants, scientific advisors and contractors. We cannot guarantee that we have entered into such agreements with each party that may have or have had access to our trade secrets or proprietary technology and processes. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures 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.

Intellectual property litigation or other legal proceedings relating to intellectual property could cause us to spend substantial resources and distract our personnel from their normal responsibilities.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims 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 and may also have an advantage in such proceedings due to their more mature and developed intellectual property portfolios. Uncertainties resulting from the initiation and continuation of intellectual property litigation or other proceedings could compromise our ability to compete in the marketplace.

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.

Periodic maintenance, renewal and annuity fees and various other government fees on any issued patent and pending patent application must be paid to the USPTO and foreign patent agencies in several stages or annually over the lifetime of our owned and in-licensed patents and patent applications. The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. In certain circumstances, we may rely on our licensing partners to pay these fees to, or comply with the procedural and documentary rules of, the relevant patent agency. With respect to our patents, we rely on outside firms and outside counsel to remind us of the due dates and to make payment after we instruct them to do so. While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application,

resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance events that could result in abandonment or lapse of a patent or patent application include failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. In such an event, potential competitors might be able to enter the market with similar or identical products or technology. If we or our licensors fail to maintain the patents and patent applications covering our product candidates, it would have a material adverse effect on our business, financial condition, results of operations and prospects.

We have limited foreign intellectual property rights and may not be able to protect our intellectual property and proprietary rights throughout the world.

We have limited intellectual property rights outside the United States. Filing, prosecuting and defending patents on product candidates in all countries throughout the world would be prohibitively expensive, and the laws of foreign countries may not protect our rights to the same extent as the laws of 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, and even where such protection is nominally available, judicial and governmental enforcement of such intellectual property rights may be lacking. 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 or licenses but enforcement is not as strong as that in the United States. These products may compete with our products, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets, and other intellectual property protection, particularly those relating to biotechnology products, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our intellectual property and proprietary rights generally. In addition, certain jurisdictions do not protect to the same extent or at all inventions that constitute new methods of treatment.

Proceedings to enforce our intellectual property and proprietary 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, could put 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 and proprietary rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

Many countries have compulsory licensing laws under which a patent owner may be compelled to grant licenses to third parties. In addition, many countries limit the enforceability of patents against government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of such patent. If we or any of our licensors are forced to grant a license to third parties with respect to any patents relevant to our business, our competitive position may be impaired, and our business, financial condition, results of operations and prospects may be adversely affected.

We may be subject to claims by third parties asserting that our employees, consultants or contractors have wrongfully used or disclosed confidential information of third parties, or we have wrongfully used or disclosed alleged trade secrets of their current or former employers or claims asserting we have misappropriated their intellectual property, or claiming ownership of what we regard as our own intellectual property.

Many of our employees, consultants and contractors were previously employed at universities or other pharmaceutical or biotechnology companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that these individuals or we have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such individual's current or former employer. Litigation may be necessary to defend against these claims.

In addition, while it is our policy to require our employees, consultants and contractors who may be involved in the development of intellectual property to execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who in fact develops intellectual property that we regard as our own. Our intellectual property assignment agreements with them may not be self-executing or may be breached, and we may be forced to bring claims against third parties, or defend claims they may bring against us, to determine the ownership of what we regard as our intellectual property. Such claims could have a material adverse effect on our business, financial conditions, results of operations and prospects.

If we fail in prosecuting or defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel, which could have a material adverse effect on our competitive business position and prospects. Such intellectual property rights could be awarded to a third party, and we could be required to obtain a license from such third party to commercialize our technology or products, which license may not be available on commercially reasonable terms, or at all, or such license may be non-exclusive. Even if we are successful in prosecuting or defending against such claims, litigation could result in substantial costs and be a distraction to our management and employees.

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

In addition to seeking patents for our some of our technology and product candidates, we also rely on trade secrets and confidentiality agreements to protect our unpatented know-how, technology and other proprietary information, to maintain our competitive position. We seek to protect our trade secrets and other proprietary technology, in part, by entering into non-disclosure and confidentiality agreements with parties who have access to them, such as our employees, corporate collaborators, outside scientific collaborators, CROs, CMOs, consultants, advisors and other third parties. We also enter into confidentiality and invention or patent assignment agreements with our employees and consultants, but we cannot guarantee that we have entered into such agreements with each party that may have or has had access to our trade secrets or proprietary technology. Despite these efforts, 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. Detecting the disclosure or misappropriation of a trade secret and enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive and time-consuming, and the outcome is unpredictable.

In addition to contractual measures, we try to protect the confidential nature of our proprietary information through other appropriate precautions, such as physical and technological security measures. However, trade secrets and know-how can be difficult to protect. These measures may not, for example, in the case of misappropriation of a trade secret by an employee or third party with authorized access, provide adequate protection for our proprietary information. Our security measures may not prevent an employee or consultant

from misappropriating our trade secrets and providing them to a competitor, and any recourse we might take against this type of misconduct may not provide an adequate remedy to protect our interests fully. In addition, trade secrets may be independently developed by others in a manner that could prevent us from receiving legal recourse. If any of our confidential or proprietary information, such as our trade secrets, were to be disclosed or misappropriated, or if any of that information was independently developed by a competitor, our competitive position could be harmed.

In addition, some courts inside and outside of the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor or other third party, we would have no right to prevent them, or those to whom they communicate it, from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor or other third party, our competitive position would be materially and adversely harmed.

If our trademarks and trade names 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 registered trademarks or trade names may be challenged, 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 registered 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. Our efforts to enforce or protect our proprietary rights related to trademarks, trade secrets, domain names, copyrights or other intellectual property may be ineffective and could result in substantial costs and diversion of resources and could adversely impact our financial condition or results of operations.

Intellectual property rights do not necessarily address all potential threats.

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:

- any product candidates we may develop will eventually become commercially available in generic or biosimilar product forms;
- others may be able to make gene editing product that are similar to ours but that are not covered by the claims of the patents that we own;
- we, or our license partners or current or future collaborators, might not have been the first to make the inventions covered by the issued patent or pending patent applications that we license or may own in the future;
- we, or our license partners or current or future collaborators, might not have been the first to file patent applications covering certain of our or their inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our owned or in-licensed intellectual property rights;

- it is possible that our pending owned and in-licensed patent applications or those we may own or in-license in the future will not lead to issued patents;
- it is possible that there are prior public disclosures that could invalidate our owned or in-licensed patents, or parts of our owned or in-licensed patents;
- it is possible that there are unpublished applications or patent applications maintained in secrecy that may later issue with claims covering our product candidates or technology similar to ours;
- it is possible that our owned or in-licensed patents or patent applications omit individual(s) that should be listed as inventor(s) or include individual(s) that should not be listed as inventor(s), which may cause these patents or patents issuing from these patent applications to be held invalid or unenforceable;
- issued patents that we hold rights to may be held invalid or unenforceable, including as a result of legal challenges by our competitors;
- the laws of foreign countries may not protect our proprietary rights or the proprietary rights of license partners or current or future collaborators to the same extent as the laws of the United States;
- the inventors of our owned or in-licensed patents or patent applications may become involved with competitors, develop products or processes that design around our patents, or become hostile to us or the patents or patent applications on which they are named as inventors;
- 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 have engaged in scientific collaborations in the past and will continue to do so in the future and our collaborators may develop adjacent or competing products that are outside the scope of our patent rights;
- 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;
- we cannot ensure that any patents issued to us or our licensors will provide a basis for an exclusive market for our commercially viable product candidates or will provide us with any competitive advantages;
- we cannot ensure that our commercial activities or product candidates will not infringe upon the patents of others;
- we cannot ensure that we will be able to successfully commercialize our product candidates on a substantial scale, if approved, before our relevant patents that we own or license expire;
- we may not develop additional proprietary technologies that are patentable;
- the patents of others may harm our business; and
- we may choose not to file a patent in order to maintain certain trade secrets or know-how, and a third party may subsequently file a patent covering such intellectual property.

Should any of these events occur, they could have a material adverse effect on our business, financial condition, results of operations and prospects.

Risks related to commercialization

Even if any of our current or future product candidates receives marketing approval, it may fail to achieve the degree of market acceptance by physicians, patients, third-party payors and others in the medical community necessary for commercial success, and the market opportunity for any of such product candidates, if approved, may be smaller than we estimate.

If any of our current or future product candidates receives marketing approval, it may nonetheless fail to gain sufficient market acceptance by physicians, patients, third-party payors and others in the medical community. For example, current CVD treatments such as statins, ezetimibe, bempedoic acid, lomitapide, mipomersen and icosapent ethyl are well-established in the medical community, and physicians may continue to rely on these treatments. Efforts to educate the medical community and third-party payors on the benefits of our product candidates may require significant resources and may not be successful. If our current or future product candidates do not achieve an adequate level of acceptance, we may not generate significant product revenues and we may not become profitable. The degree of market acceptance of our current or future product candidates, if approved for commercial sale, will depend on a number of factors, including:

- the efficacy and potential advantages of such product candidates compared to the advantages and relative risks of alternative treatments;
- the effectiveness of sales and marketing efforts;
- the cost of treatment in relation to alternative treatments, including any similar biosimilar treatments;
- our ability to offer our products, if approved, for sale at competitive prices;
- the clinical indications for which the product is approved;
- the convenience and ease of administration compared to alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of marketing and distribution support;
- the timing of market introduction of competitive products;
- the availability of third-party coverage and adequate reimbursement, and patients' willingness to pay out of pocket for required co-payments or in the absence of third-party coverage or adequate reimbursement;
- the prevalence and severity of any side effects; and
- any restrictions on the use of our products, if approved, together with other medications.

Our assessment of the potential market opportunity for our current or future product candidates is based on industry and market data that we obtained from industry publications, research, surveys and studies conducted by third parties and our analysis of these data, research, surveys and studies. Industry publications and third-party research, surveys and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. While we believe these industry publications and third-party research, surveys and studies are reliable, we have not independently verified such data. Our estimates of the potential market opportunities for our product candidates include a number of key assumptions based on our industry knowledge, industry publications and third-party research, surveys and studies, which may be based on a small sample size and fail to accurately reflect market opportunities. While we believe that our internal assumptions are reasonable, no independent source has verified such assumptions. If any of our assumptions or estimates, or these publications, research,

surveys or studies prove to be inaccurate, then the actual market for any of our product candidates may be smaller than we expect, and as a result our revenues from product sales may be limited and it may be more difficult for us to achieve or maintain profitability.

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

The development and commercialization of new drug or biologic products is highly competitive. It is particularly competitive with respect to new products for CVD, for which the standard of care is well-established. We face competition with respect to our current product candidates, and will face competition with respect to any product candidates that we may seek to develop or commercialize in the future, from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide. There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of many of the disease indications for which we are developing our product candidates. Some of these competitive products and therapies are based on scientific approaches that are similar to our approach, and others are based on entirely different approaches. 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 several approved products for LDL-C lowering or cardiovascular risk reduction, such as statins, ezetimibe, bempedoic acid, lomitapide, mipomersen and icosapent ethyl.

There are several approved products that target PCSK9 protein as a mechanism to lower LDL-C and reduce the risk of ASCVD. Evolocumab, a monoclonal antibody, or mAb, marketed as Repatha by Amgen, is approved by the FDA for the treatment of patients with heterozygous familial hypercholesterolemia, or HeFH, patients with HoFH and in patients with ASCVD. Alirocumab, a mAb marketed as Praulent by Sanofi and Regeneron, is approved by the FDA for the treatment of patients with ASCVD and for the treatment of patients with primary hyperlipidemia, including HeFH. Regeneron has sole U.S. rights to alirocumab and Sanofi has sole ex-U.S. rights to alirocumab. The approved mAb treatments act through extracellular inhibition of PCSK9 protein. Inclisiran, a siRNA marketed as Leqvio by Novartis AG, is approved in Europe for the treatment of patients with hypercholesterolemia, including HeFH, or mixed dyslipidemia. Inclisiran acts by inhibiting the synthesis of PCKS9 within liver cells, which is distinct from extracellular protein inhibition.

We are aware of several product candidates in clinical development that target PCSK9 protein as a mechanism to lower LDL-C and reduce the risk of ASCVD, including peptide-based anti PCSK9 vaccination, small molecule oral PCSK9 inhibitors, small binding proteins, and antisense oligonucleotides. In 2021, Esperion in-licensed an oral small molecule PCSK9 inhibitor from Serometrix LLC for which it plans to submit an IND in 2021.

We are aware of one other gene editing program targeting the PCKS9 gene in preclinical development. Precision Biosciences, Inc. has published preclinical data showing long-term stable reduction of low-density lipoprotein cholesterol, or LDL-C, levels in non-human primates following *in vivo* gene editing of the PCSK9 gene using its gene editing platform.

Evinacumab, a mAb targeting ANGPTL3 protein that is marketed by Regeneron, is approved by the FDA for the treatment of patients with HoFH. Evinacumab is also being evaluated by Regeneron in Phase 2 development for severe hypertriglyceridemia.

We are aware of several product candidates in clinical development that target ANGPTL3 protein as a mechanism to lower LDL-C and reduce the risk of ASCVD, including vupanorsen, an antisense oligonucleotide therapy being evaluated in a Phase 2 clinical trial by Ionis and Pfizer for the treatment of patients with elevated

non-HDL-C and triglycerides. In addition, ARO-ANG3, a siRNA targeting ANGPTL3 protein, is being evaluated in a Phase 1/2 clinical trial by Arrowhead. In 2021, Arrowhead filed an IND for a Phase 2b trial of ARO-ANG3 for the treatment of patients with mixed dyslipidemia.

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. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. In addition, our ability to compete may be affected in many cases by insurers or other third-party payors seeking to encourage the use of biosimilar products. If our product candidates achieve marketing approval, we expect that they will be priced at a significant premium over competitive biosimilar products.

Many of the companies against which we are competing or against which we may compete in the future 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 and other early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These third parties compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

If we are unable to establish sales, marketing and distribution capabilities or enter into sales, marketing and distribution agreements with third parties, we may not be successful in commercializing our current and future product candidates if and when they are approved.

We do not have a sales or marketing infrastructure and have no experience as a company with the commercialization of products. To achieve commercial success for any product for which we have obtained marketing approval, we will need to establish a sales, marketing and distribution organization, either ourselves or through collaborations or other arrangements with third parties.

In the future, we expect to build a sales and marketing infrastructure to market some of our product candidates in the United States, if and when they are approved. There are risks involved with establishing our own sales, marketing and distribution capabilities. For example, recruiting and training a sales force 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 capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses. These efforts may be costly, and our investment would be lost if we cannot retain or reposition our sales and marketing personnel.

Factors that may inhibit our efforts to commercialize our products on our own include:

- our inability to recruit, train and retain adequate numbers of effective sales, marketing, coverage or reimbursement, customer service, medical affairs and other support personnel;
- the inability of sales personnel to obtain access to physicians or persuade adequate numbers of physicians to prescribe any future products;
- the inability of reimbursement professionals to negotiate arrangements for coverage, 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;
- 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 sales and marketing organization.

If we are unable to establish our own sales, marketing and distribution capabilities and we enter into arrangements with third parties to perform these services, our product revenues and our profitability, if any, are likely to be lower than if we were to market, sell and distribute any products that we develop ourselves. In addition, we may not be successful in entering into arrangements with third parties to sell, market and distribute our product candidates or may be unable to do so on terms that are acceptable to us. We likely will 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 sales, marketing and distribution capabilities successfully, either on our own or in collaboration with third parties, we will not be successful in commercializing our product candidates.

We expect to rely on CMOs to manufacture our product candidates. If we are unable to enter into such arrangements as expected or if such organizations do not meet our supply requirements, development and/or commercialization of our product candidates may be delayed.

We expect to rely on third parties to manufacture clinical supplies of our product candidates and commercial supplies of our products, if and when approved for marketing by applicable regulatory authorities, as well as for packaging, sterilization, storage, distribution and other production logistics. If we are unable to enter into such arrangements on the terms or timeline we expect, development and/or commercialization of our product candidates may be delayed. If these third parties do not successfully carry out their contractual duties, meet expected deadlines or manufacture our product candidates in accordance with regulatory requirements, if there are disagreements between us and such parties or if such parties are unable to expand capacities to support commercialization of any of our product candidates for which we obtain marketing approval, we may not be able to fulfill, or may be delayed in producing sufficient product candidates to meet, our supply requirements. These facilities may also be affected by pandemics, including the ongoing COVID-19 pandemic, natural disasters, such as floods or fire, or such facilities could face manufacturing issues, such as contamination or regulatory concerns following a regulatory inspection of such facility. In such instances, we may need to locate an appropriate replacement third-party facility and establish a contractual relationship, which may not be readily available or on acceptable terms, which would cause additional delay and increased expense, including as a result of additional required FDA approvals, and may have a material adverse effect on our business.

Our third-party manufacturers will be subject to inspection and approval by the FDA before we can commence the manufacture and sale of any of our product candidates, and thereafter subject to FDA inspection from time to time. Failure by our third-party manufacturers to pass such inspections and otherwise satisfactorily complete the FDA approval regimen with respect to our product candidates may result in regulatory actions such as the issuance of FDA Form 483 notices of observations, warning letters or injunctions or the loss of operating licenses.

We or our third-party manufacturers may also encounter shortages in the raw materials or active pharmaceutical ingredient, or API, necessary to produce our product candidates in the quantities needed for

our clinical trials or, if our product candidates are approved, in sufficient quantities for commercialization or to meet an increase in demand, as a result of capacity constraints or delays or disruptions in the market for the raw materials or API, including shortages caused by the purchase of such raw materials or API by our competitors or others. The failure of us or our third-party manufacturers to obtain the raw materials or API necessary to manufacture sufficient quantities of our product candidates may have a material adverse effect on our business.

Even if we are able to commercialize any product candidates, the products may become subject to unfavorable pricing regulations, third-party coverage or reimbursement practices or healthcare reform initiatives, which could harm our business.

The regulations that govern marketing approvals, pricing, coverage and reimbursement for new drug products vary widely from country to country. Current and future legislation may significantly change the approval requirements in ways that could involve additional costs and cause delays in obtaining approvals. 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 revenues 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 our product candidates obtain marketing approval.

Our ability to commercialize any product candidates successfully also will depend in part on the extent to which coverage and adequate 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. Coverage and reimbursement by a third-party payor may depend upon a number of factors, including the third-party payor’s determination that use of a product is:

- a covered benefit under its health plan;
- safe, effective and medically necessary;
- appropriate for the specific patient;
- cost-effective; and
- neither experimental nor investigational.

In the United States, there is no uniform policy of coverage and reimbursement for products exists among third-party payors. As a result, obtaining coverage and reimbursement approval of a product from a government or other third-party payor is a time-consuming and costly process that could require us to provide to each payor supporting scientific, clinical and cost-effectiveness data for the use of our products on a payor-by-payor basis, with no assurance that coverage and adequate reimbursement will be obtained. The availability and adequacy of coverage and reimbursement by governmental healthcare programs such as Medicare and Medicaid, private health insurers and other third-party payors are essential for most patients to be able to afford our product candidates, if approved. Our ability to achieve acceptable levels of coverage and reimbursement for our product candidates, if approved, by governmental authorities, private health insurers and other organizations

will have an effect on our ability to successfully commercialize, our product candidates. Assuming we obtain coverage for a given product by a third-party payor, the resulting reimbursement payment rates may not be adequate or may require patient out-of-pocket costs that patients find unacceptably high.

A primary trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. Increasingly, 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. Coverage and reimbursement may not be available for any product that we commercialize and, even if these are available, the level of reimbursement may not be satisfactory. Reimbursement may affect the demand for, or the price of, any product candidate for which we obtain marketing approval. Obtaining and maintaining adequate reimbursement for our products may be difficult. We may be required to conduct expensive pharmacoeconomic studies to justify coverage and reimbursement or the level of reimbursement relative to other therapies. If coverage and adequate reimbursement are not available or reimbursement is available only to limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval.

There may be significant delays in obtaining coverage and reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the drug is approved by the FDA or similar regulatory authorities outside of the United States. Moreover, eligibility for coverage and reimbursement does not imply that a drug will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale and distribution expenses. 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 adequate reimbursement rates from both government-funded and private payors for any approved products that we develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

There can be no assurance that our product candidates, even if they are approved for sale in the United States or in other countries, will be considered medically reasonable and necessary for a specific indication or cost-effective by third-party payors, or that coverage and an adequate level of reimbursement will be available or that third-party payors' reimbursement policies will not adversely affect our ability to sell our product candidates profitably.

Our future growth depends, in part, on our ability to penetrate foreign markets, where we would be subject to additional regulatory burdens and other risks and uncertainties that, if they materialize, could harm our business.

Our future profitability will depend, in part, on our ability to commercialize our product candidates in markets outside of the United States. If we commercialize our product candidates in foreign markets, we will be subject to additional risks and uncertainties, including:

- economic weakness, including inflation, or political instability in particular economies and markets;
- the burden of complying with complex and changing foreign regulatory, tax, accounting and legal requirements, many of which vary between countries;

- different medical practices and customs in foreign countries affecting acceptance in the marketplace;
- tariffs and trade barriers, as well as other governmental controls and trade restrictions;
- other trade protection measures, import or export licensing requirements or other restrictive actions by U.S. or foreign governments;
- longer accounts receivable collection times;
- longer lead times for shipping;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- workforce uncertainty in countries where labor unrest is common;
- language barriers for technical training;
- reduced protection of intellectual property rights in some foreign countries, and related prevalence of biosimilar alternatives to therapeutics;
- foreign currency exchange rate fluctuations and currency controls;
- differing foreign reimbursement landscapes;
- uncertain and potentially inadequate reimbursement of our products; and
- the interpretation of contractual provisions governed by foreign laws in the event of a contract dispute.

If risks related to any of these uncertainties materializes, it could have a material adverse effect on our business.

Clinical trial and product liability lawsuits against us could divert our resources and could cause us to incur substantial liabilities and to limit commercialization of any products that we may develop.

We will face an inherent risk of clinical trial and product liability exposure related to the testing of our product candidates in human clinical trials, and we will face an even greater risk if we commercially sell any products that we may develop. While we currently have no products in clinical trials or that have been approved for commercial sale, the future use of product candidates by us in clinical trials, and the sale of any approved products in the future, may expose us to liability claims. These claims might be made by patients that use the product, healthcare providers, pharmaceutical companies or others selling such products. If we cannot successfully defend ourselves against claims that our product candidates or products caused injuries, we will incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- decreased demand for any product candidates or products that we may develop;
- termination of clinical trials;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants;
- significant costs to defend any related litigation;
- substantial monetary awards to trial participants or patients;
- loss of revenue;

- reduced resources of our management to pursue our business strategy; and
- the inability to commercialize any products that we may develop.

We currently do not hold any clinical trial liability insurance coverage. We may need to obtain insurance coverage as we expand our clinical trials or if we commence commercialization of our product candidates. Insurance coverage is increasingly expensive. We may not be able to obtain and maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise. If a successful clinical trial or product liability claim or series of claims is brought against us for uninsured liabilities or in excess of insured liabilities, our assets may not be sufficient to cover such claims and our business operations could be impaired.

Risks related to regulatory approval and other legal compliance matters

Gene editing is novel and the regulatory landscape that will govern any product candidates we may develop is uncertain and may change. As a result, we cannot predict the time and cost of obtaining regulatory approval, if we receive it at all, for any product candidates we may develop.

The regulatory requirements that will govern any novel gene editing product candidates we develop are not entirely clear and may change. Within the broader genetic medicines field, we are aware of a limited number of gene therapy products that have received marketing authorization from the FDA and the EMA. Even with respect to more established products that fit into the categories of gene therapies or cell therapies, the regulatory landscape is still developing. Regulatory requirements governing gene therapy products and cell therapy products have changed frequently and will likely continue to change in the future. Moreover, there is substantial, and sometimes uncoordinated, overlap in those responsible for regulation of existing gene therapy products and cell therapy products. For example, in the United States, the FDA has established the Office of Tissues and Advanced Therapies within its Center for Biologics Evaluation and Research, or 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. Gene therapy clinical trials may also be subject to review and oversight by an institutional biosafety committee, or IBC, a local institutional committee that reviews and oversees basic and clinical research conducted at the institution participating in the clinical trial. Although the FDA decides whether individual gene therapy protocols may proceed, the review process and determinations of other reviewing bodies can impede or delay the initiation of a clinical trial, even if the FDA has reviewed the trial and approved its initiation.

The same applies in the EU. The EMA's Committee for Advanced Therapies, or CAT, is responsible for assessing the quality, safety, and efficacy of advanced-therapy medicinal products. The role of the CAT is to prepare a draft opinion on an application for marketing authorization for a gene therapy medicinal candidate that is submitted to the Committee for Medicinal Products for Human Use, or CHMP, before CHMP adopts its final opinion. In the EU, the development and evaluation of a gene therapy medicinal product must be considered in the context of the relevant EU guidelines. The EMA may issue new guidelines concerning the development and marketing authorization for gene therapy medicinal products and require that we comply with these new guidelines. As a result, the procedures and standards applied to gene therapy products and cell therapy products may be applied to any product candidates we may develop, but that remains uncertain at this point.

Adverse developments in post-marketing experience or in clinical trials conducted by others of gene therapy products, cell therapy products, or products developed through the application of a base editing or other gene editing technology may cause the FDA, the EMA, and other regulatory bodies to revise the requirements for development or approval of any product candidates we may develop or limit the use of products utilizing base editing technologies, either of which could materially harm our business. In addition, the clinical trial requirements of the FDA, the EMA, and other regulatory authorities and 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 the product candidates we may develop can be more expensive and take longer than for other, better known, or more extensively studied pharmaceutical or other product candidates. Regulatory agencies administering existing or future regulations or legislation may not allow production and marketing of products utilizing base editing technology in a timely manner or under technically or commercially feasible conditions. In addition, regulatory action or private litigation could result in expenses, delays, or other impediments to our research programs or the commercialization of resulting products.

The regulatory review committees and advisory groups described above and the new guidelines they promulgate 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 these treatment candidates, or lead to significant post-approval limitations or restrictions. As we advance our research programs and develop future product candidates, we will be required to consult with these regulatory and advisory groups and to comply with applicable guidelines. If we fail to do so, we may be required to delay or discontinue development of any product candidates we identify and develop.

Because we are developing product candidates in the field of genetic medicines, a field that includes gene therapy and gene editing, in which there is little clinical experience, there is increased risk that the FDA, the EMA, or other regulatory authorities may not consider the endpoints of our clinical trials to provide clinically meaningful results and that these results may be difficult to analyze.

During the regulatory review process, we will need to identify success criteria and endpoints such that the FDA, the EMA, or other regulatory authorities will be able to determine the clinical efficacy and safety profile of any product candidates we may develop. As we are seeking to identify and develop product candidates to treat diseases in which there is no clinical experience using a gene editing approach, there is heightened risk that the FDA, the EMA, or other regulatory authorities may not consider the clinical trial endpoints that we propose to provide clinically meaningful results (reflecting a tangible benefit to patients). In addition, the resulting clinical data and results may be difficult to analyze. Even if the FDA does find our success criteria to be sufficiently validated and clinically meaningful, we may not achieve the pre-specified endpoints to a degree of statistical significance. Further, even if we do achieve the pre-specified criteria, we may produce results that are unpredictable or inconsistent with the results of the non-primary endpoints or other relevant data. The FDA also weighs the benefits of a product against its risks, and the FDA may view the efficacy results in the context of safety as not being supportive of regulatory approval. Other regulatory authorities in the EU and other countries may make similar comments with respect to these endpoints and data. Any product candidates we may develop will be based on a novel technology that makes it difficult to predict the time and cost of development and of subsequently obtaining regulatory approval. No gene editing therapeutic product has been approved in the United States or in Europe.

Even if we complete the necessary preclinical studies and clinical trials, the marketing approval process is expensive, time-consuming and uncertain and may prevent us from obtaining approvals for the commercialization of any product candidates we develop. If we are not able to obtain, or if there are delays in obtaining, required regulatory approvals, we will not be able to commercialize, or will be delayed in commercializing, product candidates we develop, and our ability to generate revenue will be materially impaired.

Any product candidates we develop and the activities associated with their development and commercialization, including their design, testing, manufacture, safety, efficacy, recordkeeping, labeling, storage, approval, advertising, promotion, sale and distribution, are subject to comprehensive regulation by the FDA and other regulatory authorities in the United States and by comparable authorities in other countries.

Failure to obtain marketing approval for a product candidate will prevent us from commercializing the product candidate in a given jurisdiction. We have not received approval to market any product candidates from regulatory authorities in any jurisdiction. We have no experience as a company in filing and supporting the applications necessary to gain marketing approvals and expect to rely on third-party CROs to assist us in this process. Securing regulatory approval requires the submission of extensive preclinical and clinical data and supporting information, including manufacturing information, to the various regulatory authorities for each therapeutic indication to establish the biologic product candidate's safety, purity and potency. Securing regulatory approval also requires the submission of information about the product manufacturing process to, and inspection of manufacturing facilities by, the relevant regulatory authority. Any product candidates we develop may not be effective, may be only moderately effective or may prove to have undesirable or unintended side effects, toxicities or other characteristics that may preclude our obtaining marketing approval or prevent or limit commercial use.

The process of obtaining marketing approvals, both in the United States and abroad, is expensive, may take many years if additional clinical trials are required, if approval is obtained at all, and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the product candidates involved. Of the large number of products in development, only a small percentage successfully complete the FDA or foreign regulatory approval processes and are commercialized. Even if any product candidates we may develop demonstrate safety and efficacy in clinical trials, the regulatory agencies may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval. Additional delays may result if an FDA Advisory Committee or other regulatory authority recommends non-approval or restrictions on approval. Changes in marketing approval policies during the development period, changes in or the enactment of additional statutes or regulations, or changes in regulatory review for each submitted product application, may cause delays in the approval or rejection of an application. The FDA and comparable authorities in other countries have substantial discretion in the approval process and may refuse to accept any application or may decide that our data is insufficient for approval and require additional preclinical, clinical or other studies. In addition, varying interpretations of the data obtained from preclinical and clinical testing could delay, limit or prevent marketing approval of a product candidate. Any marketing approval we ultimately obtain may be limited or subject to restrictions or post-approval commitments that render the approved product not commercially viable.

Finally, disruptions at the FDA and other agencies may prolong the time necessary for new drugs to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA, have had to furlough critical employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business.

If we experience delays in obtaining approval or if we fail to obtain approval of any product candidates we develop, the commercial prospects for those product candidates may be harmed and our ability to generate revenues will be materially impaired.

Obtaining and maintaining marketing approval or commercialization of our product candidates in the United States does not mean that we will be successful in obtaining marketing approval of our product candidates in other jurisdictions. Failure to obtain marketing approval in foreign jurisdictions would prevent any product candidates we develop from being marketed in such jurisdictions, which, in turn, would materially impair our ability to generate revenue.

In order to market and sell any product candidates we may develop in the European Union and many other foreign jurisdictions, we or our collaborators must obtain separate marketing approvals and comply with

numerous and varying regulatory requirements. The approval procedure varies among countries and can involve additional testing. The time required to obtain approval may differ substantially from that required to obtain FDA approval. The regulatory approval process outside the United States generally includes all of the risks associated with obtaining FDA approval. In addition, in many countries outside the United States, it is required that the product be approved for reimbursement before the product can be approved for sale in that country. We or these third parties may not obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by the FDA does not ensure approval by regulatory authorities in other countries or jurisdictions, and approval by one regulatory authority outside the United States does not ensure approval by regulatory authorities in other countries or jurisdictions or by the FDA. We may not be able to file for marketing approvals and may not receive necessary approvals to commercialize our product candidates in any jurisdiction, which would materially impair our ability to generate revenue.

Additionally, we could face heightened risks with respect to seeking marketing approval in the United Kingdom as a result of the recent withdrawal of the United Kingdom from the European Union, commonly referred to as Brexit. Pursuant to the formal withdrawal arrangements agreed between the United Kingdom and the European Union, the United Kingdom withdrew from the European Union, effective December 31, 2020. On December 24, 2020, the United Kingdom and the European Union entered into a Trade and Cooperation Agreement. The agreement sets out certain procedures for approval and recognition of medical products in each jurisdiction.

Any delay in obtaining, or an inability to obtain, any marketing approvals, as a result of the Trade and Cooperation Agreement or otherwise, would prevent us from commercializing any product candidates in the United Kingdom and/or the European Union and restrict our ability to generate revenue and achieve and sustain profitability. If any of these outcomes occur, we may be forced to restrict or delay efforts to seek regulatory approval in the United Kingdom and/or the European Union for any product candidates we may develop, which could significantly and materially harm our business.

A fast track, breakthrough therapy or priority review designation by the FDA may not lead to a faster development or regulatory review or approval process and does not assure FDA approval of our product candidates.

If a product candidate is intended for the treatment of a serious or life-threatening condition and the product candidate demonstrates the potential to address unmet medical need for this condition, the sponsor may apply to the FDA for fast track designation. For fast track products, sponsors may have greater interactions with the FDA and the FDA may initiate review of sections of a fast track product's application before the application is complete. This rolling review may be available if the FDA determines, after preliminary evaluation of clinical data submitted by the sponsor, that a fast track product may be effective.

In addition, an applicant may seek designation of its product as a breakthrough therapy, which is a drug that is intended, alone or in combination with one or more other drugs, to treat a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. For drugs and biologics that have been designated as breakthrough therapies, interaction and communication between the FDA and the sponsor of the trial can help to identify the most efficient path for clinical development while minimizing the number of patients placed in ineffective control regimens.

Further, if the FDA determines that a product candidate offers major advances in treatment or provides a treatment where no adequate therapy exists, the FDA may designate the product candidate for priority review. Significant improvement may be illustrated by evidence of increased effectiveness in the treatment of a condition, elimination or substantial reduction of a treatment-limiting product reaction, documented

enhancement of patient compliance that may lead to improvement in serious outcomes, and evidence of safety and effectiveness in a new subpopulation. A priority review designation means that the goal for the FDA to review an application is six months, rather than the standard review period of ten months.

We may seek these and other designations for our product candidates. The FDA has broad discretion with respect to whether or not to grant these designations to a product candidate, so even if we believe a particular product candidate is eligible for such designation or status, the FDA may decide not to grant it. Moreover, a fast track or breakthrough therapy designation does not necessarily mean a faster regulatory review process or necessarily confer any advantage with respect to approval compared to conventional FDA procedures. As a result, while we may seek and receive these designations for our product candidates, we may not experience a faster development process, review or approval compared to conventional FDA procedures. In addition, the FDA may withdraw these designations if it believes that the designation is no longer supported by data from our clinical development program.

We may not be able to obtain orphan drug exclusivity for any product candidates we may develop, and even if we do, that exclusivity may not prevent the FDA or the EMA from approving other competing products.

Under the Orphan Drug Act, the FDA may designate a product as an orphan drug if it is a drug or biologic intended to treat a rare disease or condition. A similar regulatory scheme governs approval of orphan products by the EMA in the European Union. Generally, if a product candidate with an orphan drug designation subsequently receives the first marketing approval for the indication for which it has such designation, the product is entitled to a period of marketing exclusivity, which precludes the FDA or the EMA from approving another marketing application for the same product for the same therapeutic indication for that time period. The applicable period is seven years in the United States and ten years in the European Union. The exclusivity period in the European Union can be reduced to six years if a product no longer meets the criteria for orphan drug designation, in particular if the product is sufficiently profitable so that market exclusivity is no longer justified.

In order for the FDA to grant orphan drug exclusivity to one of our products, the agency must find that the product is indicated for the treatment of a condition or disease with a patient population of fewer than 200,000 individuals annually in the United States. The FDA may conclude that the condition or disease for which we seek orphan drug exclusivity does not meet this standard. Even if we obtain orphan drug exclusivity for a product, that exclusivity may not effectively protect the product from competition because different products can be approved for the same condition. In particular, the concept of what constitutes the “same drug” for purposes of orphan drug exclusivity remains in flux in the context of gene therapies, and the FDA has issued recent draft guidance suggesting that it would not consider two genetic medicine products to be different drugs solely based on minor differences in the transgenes or vectors. In addition, even after an orphan drug is approved, the FDA can subsequently approve the same product for the same condition if the FDA concludes that the later product is clinically superior in that it is shown to be safer, more effective or makes a major contribution to patient care. Orphan drug exclusivity may also be lost if the FDA or EMA determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the product to meet the needs of the patients with the rare disease or condition.

In 2017, the Congress passed the FDA Reauthorization Act of 2017, or the FDARA. FDARA, among other things, codified the FDA’s pre-existing regulatory interpretation, to require that a drug sponsor demonstrate the clinical superiority of an orphan drug that is otherwise the same as a previously approved drug for the same rare disease in order to receive orphan drug exclusivity. Under Omnibus legislation signed by President Trump on December 27, 2020, the requirement for a product to show clinical superiority applies to drugs and biologics that received orphan drug designation before enactment of FDARA in 2017, but have not yet been approved or licensed by FDA. We do not know if, when, or how the FDA may change the orphan drug regulations and policies

in the future, and it is uncertain how any changes might affect our business. Depending on what changes the FDA may make to its orphan drug regulations and policies, our business could be adversely impacted.

Negative public opinion of gene editing and increased regulatory scrutiny of gene editing and genetic research may adversely impact public perception of our future product candidates.

Our potential therapeutic products involve introducing genetic material into patients' cells. The clinical and commercial success of our potential products will depend in part on public acceptance of the use of gene editing and gene regulation for the prevention or treatment of human diseases. Public attitudes may be influenced by claims that gene editing and gene regulation are unsafe, unethical or immoral, and, consequently, our products may not gain the acceptance of the public or the medical community. Adverse public attitudes may adversely impact our ability to enroll clinical trials. Moreover, our success will depend upon physicians prescribing, and their patients being willing to receive, treatments that involve the use of product candidates we may develop in lieu of, or in addition to, existing treatments with which they are already familiar and for which greater clinical data may be available.

More restrictive government regulations or negative public opinion would have a negative effect on our business or financial condition and may delay or impair the development and commercialization of our product candidates or demand for any products once approved. For example, in 2003, trials using early versions of murine gamma-retroviral vectors, which integrate with, and thereby alter, the host cell's DNA, have led to several well-publicized adverse events, including reported cases of leukemia. Adverse events in our clinical trials, even if not ultimately attributable to our product candidates, and the resulting publicity could result in increased governmental regulation, unfavorable public perception, potential regulatory delays in the testing or approval of our product candidates, stricter labeling requirements for those product candidates that are approved and a decrease in demand for any such product candidates. The risk of cancer remains a concern for gene editing and we cannot assure that it will not occur in any of our planned or future clinical trials. If any such adverse events occur, commercialization of our product candidates or further advancement of our clinical trials could be halted or delayed, which would have a negative impact on our business and operations.

Even if we, or any collaborators we may have, obtain marketing approvals for any product candidates we develop, the terms of approvals and ongoing regulation of our products could require the substantial expenditure of resources and may limit how we, or they, manufacture and market our products, which could materially impair our ability to generate revenue.

Any product candidate for which we obtain marketing approval, along with the manufacturing processes, post-approval clinical data, labeling, advertising, and promotional activities for such product, will be subject to continual requirements of and review by the FDA and other regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, registration and listing requirements, cGMP requirements relating to quality control, quality assurance and corresponding maintenance of records and documents, and requirements regarding the distribution of samples to physicians and recordkeeping. Even if marketing approval of a product candidate is granted, the approval may be subject to limitations on the indicated uses for which the product may be marketed or to the conditions of approval, or contain requirements for costly post-marketing testing and surveillance to monitor the safety or efficacy of the product.

Accordingly, assuming we, or any collaborators we may have, receive marketing approval for one or more product candidates we develop, we, and such collaborators, and our and their contract manufacturers will continue to expend time, money, and effort in all areas of regulatory compliance, including manufacturing, production, product surveillance, and quality control. If we and such collaborators are not able to comply with post-approval regulatory requirements, we and such collaborators could have the marketing approvals for our products withdrawn by regulatory authorities and our, or such collaborators', ability to market any future

products could be limited, which could adversely affect our ability to achieve or sustain profitability. Further, the cost of compliance with post-approval regulations may have a negative effect on our business, operating results, financial condition, and prospects.

Any product candidate for which we obtain marketing approval could be subject to restrictions or withdrawal from the market, and we may be subject to substantial penalties if we fail to comply with regulatory requirements or if we experience unanticipated problems with our products, when and if any of them are approved.

The FDA and other regulatory agencies closely regulate the post-approval marketing and promotion of medicines to ensure that they are marketed only for the approved indications and in accordance with the provisions of the approved labeling. Although physicians may prescribe products for uses not described in the product's labeling, known as off-label uses, in their professional medical judgement, the FDA and other regulatory agencies impose stringent restrictions on manufacturers' communications regarding off-label use, and if we market our products, if approved, in a manner inconsistent with their approved labeling, we may be subject to enforcement action for off-label marketing by the FDA and other federal and state enforcement agencies, including the Department of Justice, or DOJ. Violation of the Federal Food, Product, and Cosmetic Act and other statutes, including the False Claims Act, relating to the promotion and advertising of prescription products may also lead to investigations or allegations of violations of federal and state health care fraud and abuse laws and state consumer protection laws.

In addition, later discovery of previously unknown problems with our product candidates, manufacturers, or manufacturing processes, or failure to comply with regulatory requirements, may yield various results, including:

- restrictions on such products, manufacturers, or manufacturing processes;
- restrictions on the labeling or marketing of a medicine;
- restrictions on the distribution or use of a medicine;
- requirements to conduct post-marketing clinical trials;
- receipt of warning or untitled letters;
- withdrawal of the medicines from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;
- recall of medicines;
- fines, restitution, or disgorgement of profits or revenue;
- suspension or withdrawal of marketing approvals;
- suspension of any ongoing clinical trials;
- refusal to permit the import or export of our medicines;
- product seizure; and
- injunctions or the imposition of civil or criminal penalties.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described

above may inhibit our ability to commercialize any product candidates we develop and adversely affect our business, financial condition, results of operations, and prospects.

Any relationships we may have with customers, healthcare providers and professionals, and third-party payors, among others, will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which could expose us to penalties, including criminal sanctions, civil penalties, contractual damages, reputational harm, fines, disgorgement, exclusion from participation in government healthcare programs, curtailment or restricting of our operations, and diminished profits and future earnings.

Healthcare providers, physicians and third-party payors will play a primary role in the recommendation and prescription of any products for which we are able to obtain marketing approval. Any arrangements we have with healthcare providers, third-party payors and customers will subject us to broadly applicable fraud and abuse and other healthcare laws and regulations. The laws and regulations may constrain the business or financial arrangements and relationships through which we conduct clinical research, market, sell and distribute any products for which we obtain marketing approval. These include the following:

- the federal healthcare anti-kickback statute prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order, or recommendation of, any good or service, for which payment may be made under federal and state healthcare programs such as Medicare and Medicaid;
- the federal civil and criminal false claims laws, including the federal False Claims Act, which can be enforced through civil whistleblower or qui tam actions, and civil monetary penalty laws impose civil and criminal penalties against individuals or entities for knowingly presenting or causing to be presented, to the federal government, claims for payment or approval from Medicare, Medicaid or other government payers that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government, with potential liability including mandatory treble damages and significant per-claim penalties;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which prohibits, among other things, knowingly and willfully executing, or attempting to execute, a scheme or artifice to defraud any healthcare benefit program or obtain, by means of false or fraudulent pretenses, representations, or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, regardless of the payor (e.g., public or private), and knowingly and willfully falsifying, concealing or covering up by any trick or device a material fact or making any materially false, fictitious or fraudulent statements in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters;
- HIPAA, as further amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, which imposes certain requirements, including mandatory contractual terms, on covered entities subject to the rule, such as health plans, healthcare clearinghouses and certain healthcare providers, as well as their respective business associates and their subcontractors that perform services for them that involve the use, or disclosure of, individually identifiable health information, relating to the privacy, security, and transmission of such individually identifiable health information;
- the federal transparency requirements under the federal Physician Payments Sunshine Act, which requires certain manufacturers of drugs, devices, biologics and medical supplies to report to the Department of Health and Human Services, or HHS, information related to payments and other transfers of value to physicians, as defined by such law, and teaching hospitals and ownership and investment interests held by physicians (as defined by such law) and their immediate family members and applicable group purchasing

organizations, and, beginning in 2022, will require applicable manufacturers to report information regarding payments and other transfers of value provided during the previous year to physician assistants, nurse practitioners, clinical nurse specialists, certified registered nurse anesthetists, anesthesiologist assistants, and certified nurse midwives; and

- analogous state laws and regulations, such as state anti-kickback and false claims laws, which may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payers, including private insurers, and certain 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 in addition to requiring drug manufacturers to report information related to drug pricing and payments to physicians and other healthcare providers or marketing expenditures and state and local laws that require the registration of sales representatives; and state and foreign laws governing the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Efforts to ensure that any business arrangements we have with third parties, and our business generally, will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations 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 these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, individual imprisonment, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, exclusion of products from government funded healthcare programs, such as Medicare and Medicaid, disgorgement, contractual damages, reputational harm, and the curtailment or restructuring of our operations. Defending against any such actions can be costly, time-consuming and may require significant financial and 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. Further, if any of the physicians or other healthcare providers or entities with whom we expect to do business is found to be not in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

Current and future legislation may increase the difficulty and cost for us and any collaborators to obtain marketing approval and commercialize our product candidates and affect the prices we, or they, may obtain.

In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could, among other things, prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability, or the ability of any collaborators, to profitably sell or commercialize any product candidate for which we, or they, obtain marketing approval. We expect that current laws, as well as other healthcare reform measures that may be adopted in the future, may result in more rigorous coverage criteria and in additional downward pressure on the price that we, or any collaborators, may receive for any approved products.

In March 2010, President Obama signed into law the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the ACA. In addition, other legislative changes have been proposed and adopted since the ACA was enacted. In August 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction

to several government programs. These changes included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, which went into effect in April 2013 and will remain in effect through 2030, with the exception of a temporary suspension from May 1, 2020 through December 31, 2021, unless additional Congressional action is taken. The American Taxpayer Relief Act of 2012, among other things, reduced Medicare payments to several providers and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws may result in additional reductions in Medicare and other healthcare funding and otherwise affect the prices we may obtain for any of our product candidates for which we may obtain regulatory approval or the frequency with which any such product candidate is prescribed or used.

Since enactment of the ACA, there have been, and continue to be, numerous legal challenges and Congressional actions to repeal and replace provisions of the law. For example, with enactment of the Tax Act, Congress repealed the “individual mandate.” The repeal of this provision, which requires most Americans to carry a minimal level of health insurance, became effective in 2019. Further, on December 14, 2018, a U.S. District Court judge in the Northern District of Texas ruled that the individual mandate portion of the ACA is an essential and inseverable feature of the ACA, and therefore because the mandate was repealed as part of the Tax Cuts and Jobs Act, the remaining provisions of the ACA are invalid as well. On December 18, 2019, the Court of Appeals for the Fifth Circuit court affirmed the lower court’s ruling that the individual mandate portion of the ACA is unconstitutional and it remanded the case to the district court for reconsideration of the severability question and additional analysis of the provisions of the ACA. Thereafter, the U.S. Supreme Court agreed to hear this case. Oral argument in the case took place on November 10, 2020. On February 10, 2021, the Biden administration withdrew the federal government’s support for overturning the ACA. A ruling by the Court is expected sometime this year. Litigation and legislation over the ACA are likely to continue, with unpredictable and uncertain results.

The former Trump presidential administration also took executive actions to undermine or delay implementation of the ACA, including directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from, or delay the implementation of any provision of the ACA that would impose a fiscal or regulatory burden on states, individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. On January 28, 2021, however, President Biden revoked those orders and issued a new Executive Order which directs federal agencies to reconsider rules and other policies that limit Americans’ access to health care, and consider actions that will protect and strengthen that access. Under this Order, federal agencies are directed to re-examine: policies that undermine protections for people with pre-existing conditions, including complications related to COVID-19; demonstrations and waivers under Medicaid and the ACA that may reduce coverage or undermine the programs, including work requirements; policies that undermine the Health Insurance Marketplace or other markets for health insurance; policies that make it more difficult to enroll in Medicaid and the ACA; and policies that reduce affordability of coverage or financial assistance, including for dependents. This Executive Order also directs the U.S. Department of Health and Human Services to create a special enrollment period for the Health Insurance Marketplace in response to the COVID-19 pandemic.

We expect that these healthcare reform measures, as well as other healthcare reform measures that may be adopted in the future, may result in additional reductions in Medicare and other healthcare funding, more rigorous coverage criteria, new payment methodologies and additional downward pressure on the price that we receive for any approved product and/or the level of reimbursement physicians receive for administering any approved product we might bring to market. Reductions in reimbursement levels may negatively impact the prices we receive or the frequency with which our products are prescribed or administered. Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors. Accordingly, such reforms, if enacted, could have an adverse effect on anticipated revenue

from product candidates that we may successfully develop and for which we may obtain marketing approval and may affect our overall financial condition and ability to develop or commercialize product candidates. It is also possible that additional governmental action will be taken in response to the COVID-19 pandemic.

The prices of prescription pharmaceuticals in the United States and foreign jurisdictions is subject to considerable legislative and executive actions and could impact the prices we obtain for our products, if and when licensed.

The prices of prescription pharmaceuticals have also been the subject of considerable discussion in the United States. To date, there have been several recent U.S. Congressional inquiries, as well as proposed and enacted state and federal legislation designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, reduce the costs of drugs under Medicare and reform government program reimbursement methodologies for products. To those ends, President Trump issued several executive orders intended to lower the costs of prescription drug products. Certain of these orders are reflected in recently promulgated regulations, including an interim final rule implementing President Trump's most favored nation model, but such final rule is currently subject to a nationwide preliminary injunction. It remains to be seen whether these orders and resulting regulations will remain in force during the Biden administration. Further, on September 24, 2020, the former Trump presidential administration finalized a rule allowing states or certain other non-federal government entities to submit importation program proposals to the FDA for review and approval. Applicants are required to demonstrate that their importation plans pose no additional risk to public health and safety and will result in significant cost savings for consumers. The FDA has issued draft guidance that would allow manufacturers to import their own FDA-approved drugs that are authorized for sale in other countries (multi-market approved products).

At the state level, individual states are increasingly aggressive in passing legislation and implementing 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. In addition, regional health care organizations 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 health care programs. These measures could reduce the ultimate demand for our products, once approved, or put pressure on our product pricing. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our product candidates or additional pricing pressures.

In the European Union, similar political, economic and regulatory developments may affect our ability to profitably commercialize our product candidates, if approved. In markets outside of the United States and the European Union, reimbursement and healthcare payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies. In some countries, particularly the countries of the European Union, the pricing of prescription pharmaceuticals is subject to governmental control. In these countries, pricing negotiations with governmental authorities can take considerable time after the receipt of marketing approval for a product. To obtain reimbursement or pricing approval in some countries, we may be required to conduct a clinical trial that compares the cost-effectiveness of our product candidate to other available therapies. If reimbursement of our products is unavailable or limited in scope or amount, or if pricing is set at unsatisfactory levels, our business could be harmed, possibly materially.

Compliance with global privacy and data security requirements could result in additional costs and liabilities to us or inhibit our ability to collect and process data globally or transfer such data across borders, and the failure to comply with such requirements could subject us to significant fines and penalties, which may have a material adverse effect on our business, financial condition or results of operations.

The regulatory framework for the collection, use, safeguarding, sharing, transfer and other processing of information worldwide is rapidly evolving and is likely to remain uncertain for the foreseeable future. Globally, virtually every jurisdiction in which we operate has established its own data security and privacy frameworks with which we must comply. For example, the collection, use, disclosure, transfer, or other processing of personal data regarding individuals in the European Union, including personal health data, is subject to the EU General Data Protection Regulation, or the GDPR, which took effect across all member states of the European Economic Area, or EEA, in May 2018. The GDPR is wide-ranging in scope and imposes numerous requirements on companies that process personal data, including requirements relating to processing health and other sensitive data, obtaining consent of the individuals to whom the personal data relates, providing information to individuals regarding data processing activities, implementing safeguards to protect the security and confidentiality of personal data, providing notification of data breaches, and taking certain measures when engaging third-party processors. The GDPR would increase our obligations with respect to clinical trials conducted in the EEA by expanding the definition of personal data to include coded data and requiring changes to informed consent practices and more detailed notices for clinical trial subjects and investigators. In addition, the GDPR also imposes strict rules on the transfer of personal data to countries outside the European Union and, as a result, increases the scrutiny that clinical trial sites located in the EEA should apply to transfers of personal data from such sites. The GDPR also permits data protection authorities to require destruction of improperly gathered or used personal information and/or impose substantial fines for violations of the GDPR, which can be up to four percent of global revenues or 20 million Euros, whichever is greater, and it also confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies, and obtain compensation for damages resulting from certain violations of the GDPR. In addition, the GDPR provides that European Union member states may make their own further laws and regulations limiting the processing of personal data, including genetic, biometric or health data.

The GDPR also imposes strict rules on the transfer of personal data to countries outside EEA, including the United States, unless the parties to the transfer have implemented safeguards to protect the transferred personal information. The Court of Justice of the European Union, or CJEU, recently raised questions in a decision that has been dubbed Schrems II about whether the European Commission's Standard Contractual Clauses, one of the primary mechanisms used by companies to import personal information from Europe, complies with the GDPR. The Schrems II decision also invalidated the EU-U.S. Privacy Shield, a mechanism used by numerous companies to transfer personal data from the EU to the U.S. While the CJEU upheld the validity of the Standard Contractual Clauses, the CJEU ruled that the underlying data transfers must be assessed on a case-by-case basis by the data controller to determine whether the personal information will be adequately protected. Further, the European Commission recently proposed updates to the Standard Contractual Clauses. At present, there are few if any viable alternatives to the Standard Contractual Clauses and, therefore, there is uncertainty regarding how to ensure that transfers of personal information from Europe to the United States comply with the GDPR. As such, any transfers by us, or our vendors, of personal information from Europe may not comply with European data protection laws and may increase our exposure to the GDPR's heightened sanctions for violations of its cross-border data transfer restrictions. Loss of our ability to transfer personal information from Europe may also require us to increase our data processing capabilities in those jurisdictions at significant expense.

Further, the UK's withdrawal from the EU and EEA on January 31, 2020 has created uncertainty with regard to data protection regulation in the UK. As of January 1, 2021, companies are subject to the UK GDPR and UK Data

Protection Act of 2018, which retains the GDPR in the UK's national law. In particular, the collection, use, storage, disclosure, transfer, or other processing of personal data (including health data processed in the context of clinical trials) regarding data subjects in the U.K. and/or carried out in the context of the activities of our establishment in the U.K. is subject to the UK GDPR and the UK Data Protection Act of 2018. However, it is still unclear whether the transfer of personal information from the EEA to the UK will remain lawful under the GDPR.

There are a broad variety of data protection laws that are applicable to our activities, and a wide range of enforcement agencies at both the state and federal levels that can review companies for privacy and data security concerns based on general consumer protection laws. The Federal Trade Commission and state Attorneys General all are aggressive in reviewing privacy and data security protections for consumers. New laws also are being considered at both the state and federal levels. For example, the California Consumer Privacy Act, or CCPA—which went into effect on January 1, 2020—is creating similar risks and obligations as those created by GDPR, though the Act does exempt certain information collected as part of a clinical trial subject to the Federal Policy for the Protection of Human Subjects (the Common Rule). In addition, California voters approved a new privacy law, the California Privacy Rights Act, or CPRA, in the November 3, 2020 election. Effective starting on January 1, 2023, the CPRA will significantly modify the CCPA, including by expanding consumers' rights with respect to certain sensitive personal information. The CPRA also creates a new state agency that will be vested with authority to implement and enforce the CCPA and the CPRA. It remains unclear, however, how the CCPA and CPRA will be interpreted.

New legislation proposed or enacted in Illinois, Massachusetts, Nevada, New Jersey, New York, Rhode Island, Virginia, Washington and other states, and a proposed right to privacy amendment to the Vermont Constitution, imposes, or has the potential to impose, additional obligations on companies that collect, store, use, retain, disclose, transfer and otherwise process confidential, sensitive and personal information, and will continue to shape the data privacy environment nationally. For example, Virginia became the second state to enact a comprehensive privacy law when it recently passed the Consumer Data Protection Act, or CDPA, which will take effect on January 1, 2023. The CDPA contains provisions that require businesses subject to the legislation to conduct data protection assessments in certain circumstances and that require opt-in consent from Virginia consumers to process certain sensitive personal information.

Overall, state laws are changing rapidly and may be more stringent or broader in scope, or offer greater individual rights, with respect to confidential, sensitive and personal information than federal, international or other state laws, and such laws may differ from each other, which may complicate compliance efforts. There is also discussion in Congress of a new federal data protection and privacy law to which we would become subject if it is enacted. All of these evolving compliance and operational requirements impose significant costs that are likely to increase over time, may require us to modify our data processing practices and policies, divert resources from other initiatives and projects, and could restrict the way products and services involving data are offered, all of which could significantly harm our business, financial condition, results of operations and prospects.

Many other states are considering similar legislation. A broad range of legislative measures also have been introduced at the federal level. Accordingly, failure to comply with federal and state laws (both those currently in effect and future legislation) regarding privacy and security of personal information could expose us to fines and penalties under such laws. There also is the threat of consumer class actions related to these laws and the overall protection of personal data. Even if we are not determined to have violated these laws, government investigations into these issues typically require the expenditure of significant resources and generate negative publicity, which could harm our reputation and our business.

Given the breadth and depth of changes in data protection obligations, preparing for and complying with these requirements is rigorous and time intensive and requires significant resources and a review of our technologies,

systems and practices, as well as those of any third-party collaborators, service providers, contractors or consultants that process or transfer personal data collected in the European Union. The GDPR and other changes in laws or regulations associated with the enhanced protection of certain types of sensitive data, such as healthcare data or other personal information from our clinical trials, could require us to change our business practices and put in place additional compliance mechanisms, may interrupt or delay our development, regulatory and commercialization activities and increase our cost of doing business, and could lead to government enforcement actions, private litigation and significant fines and penalties against us and could have a material adverse effect on our business, financial condition or results of operations.

In addition, any breach of privacy laws or data security laws, particularly resulting in a significant security incident or breach involving the misappropriation, loss or other unauthorized use or disclosure of sensitive or confidential patient or consumer information, could have a material adverse effect on our business, reputation and financial condition. As a data controller, we will be accountable for any third-party service providers we engage to process personal data on our behalf, including our CROs. We attempt to mitigate the associated risks but there is no assurance that privacy and security-related safeguards will protect us from all risks associated with the third-party processing, storage and transmission of such information.

Our employees, principal investigators, consultants and commercial partners may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of fraud or other misconduct by our employees, vendors, consultants and partners, and, if we commence clinical trials, our principal investigators and CROs. Misconduct by these parties could include intentional failures to comply with FDA regulations or the regulations applicable in the European Union and other jurisdictions, provide accurate information to the FDA, the European Commission, and other regulatory authorities, comply with healthcare fraud and abuse laws and regulations in the United States and abroad, report financial information or data accurately, or disclose unauthorized activities to us. In particular, sales, marketing, and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing and other abusive practices. These laws and regulations restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs, and other business arrangements. Such misconduct also could involve the improper use of information obtained in the course of clinical trials or interactions with the FDA or other regulatory authorities, which could result in regulatory sanctions and cause serious harm to our reputation. We have adopted a code of conduct applicable to all of our employees, but it is not always possible to identify and deter employee misconduct, 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 government investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, financial condition, results of operations and prospects, including the imposition of significant fines or other sanctions.

Laws and regulations governing any international operations we may have in the future may preclude us from developing, manufacturing and selling certain product candidates outside of the United States and require us to develop and implement costly compliance programs.

We are subject to numerous laws and regulations in each jurisdiction outside the United States in which we operate. The creation, implementation and maintenance of international business practices compliance programs is costly and such programs are difficult to enforce, particularly where reliance on third parties is required.

The Foreign Corrupt Practices Act, or FCPA, prohibits any U.S. individual or business from paying, offering, authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party, or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with certain accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations. The anti-bribery provisions of the FCPA are enforced primarily by the DOJ. The Securities and Exchange Commission, or SEC, is involved with enforcement of the books and records provisions of the FCPA.

Compliance with the FCPA and other anti-corruption laws potentially applicable to our business is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the compliance with the FCPA and other anti-corruption laws presents particular challenges in the pharmaceutical industry, because, in many countries, hospitals are operated by the government, and doctors and other hospital employees are considered foreign officials. Certain payments to hospitals in connection with clinical trials and other work have been deemed to be improper payments to government officials and have led to FCPA enforcement actions.

We are also subject to other laws and regulations governing our international operations, including applicable export control laws, economic sanctions on countries and persons, and customs requirements. In addition, various laws, regulations and executive orders also restrict the use and dissemination outside of the United States, or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. Our expansion outside of the United States has required, and will continue to require, us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing, manufacturing, or selling certain drugs and drug candidates outside of the United States, which could limit our growth potential and increase our development costs.

There is no assurance that we will be completely effective in ensuring our compliance with the FCPA and other applicable anti-corruption, export, sanctions, and customs laws. The failure to comply with laws governing international business practices may result in substantial penalties, including suspension or debarment from government contracting. Violations of these laws, including the FCPA, can result in significant civil and criminal penalties. Indictment alone under the FCPA can lead to suspension of the right to do business with the U.S. government until the pending claims are resolved. Conviction of a violation of the FCPA can result in long-term disqualification as a government contractor. The termination of a government contract or relationship as a result of our failure to satisfy any of our obligations under laws governing international business practices would have a negative impact on our operations and harm our reputation and ability to procure government contracts. The SEC also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions.

If we or any third-party manufacturer we engage now or in the future fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs or liabilities that could have a material adverse effect on our business.

We and third-party manufacturers we engage now are, and any third-party manufacturer we may engage in the future will be, subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste products. 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. We also could incur significant costs associated with civil or criminal fines and penalties.

Although we maintain general liability insurance as well as 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 maintain insurance for environmental liability or toxic tort claims that may be asserted against us in connection with our storage or disposal of biological, hazardous or radioactive materials.

In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or commercialization efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Further, with respect to the operations of our current and any future third-party contract manufacturers, it is possible that if they fail to operate in compliance with applicable environmental, health and safety laws and regulations or properly dispose of wastes associated with our products, we could be held liable for any resulting damages, suffer reputational harm or experience a disruption in the manufacture and supply of our product candidates or products. In addition, our supply chain may be adversely impacted if any of our third-party contract manufacturers become subject to injunctions or other sanctions as a result of their non-compliance with environmental, health and safety laws and regulations.

Risks related to employee matters and managing growth

Our future success depends on our ability to retain key executives and to attract, retain and motivate qualified personnel.

We are highly dependent on the research and development, clinical, financial, operational and other business expertise of Sekar Kathiresan, M.D., our chief executive officer, Andrew Ashe, J.D., our president, chief operating officer and general counsel, and Andrew Bellinger, M.D., Ph.D., our chief scientific officer, as well as the other principal members of our management, scientific and clinical teams. Although we have entered into employment agreements with our executive officers, each of them may terminate their employment with us at any time. We do not maintain "key person" insurance for any of our executives or other employees. Recruiting and retaining qualified scientific, clinical, manufacturing, accounting, legal and sales and marketing personnel will also be critical to our success.

The loss of the services of our executive officers or other key employees could impede the achievement of our research, development and commercialization objectives and seriously harm our ability to successfully implement our business strategy. Furthermore, replacing executive officers and key employees may be difficult and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to successfully develop, gain marketing approval of and commercialize products. Competition to hire from this limited pool is intense, and we may be unable to hire, train, retain or motivate these key personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors, including scientific and clinical advisors, to assist us in formulating our research and development and commercialization strategy. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us. Our success as a public company also depends on implementing and maintaining internal controls and the accuracy and timeliness of our financial reporting. If we are unable to continue to attract and retain high quality personnel, our ability to pursue our growth strategy will be limited.

We expect to expand our development and regulatory capabilities and potentially implement sales, marketing and distribution capabilities, and as a result, we may encounter difficulties in managing our growth, which could disrupt our operations.

As our development progresses, we expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of drug development, clinical, regulatory affairs, manufacturing and quality control and, if any of our product candidates receive marketing approval, sales, marketing and distribution. To manage our anticipated future growth, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities and continue to recruit and train additional qualified personnel. Due to our limited financial resources and the limited experience of our management team in managing a company with such anticipated growth, we may not be able to effectively manage the expansion of our operations or recruit and train additional qualified personnel. The expansion of our operations may lead to significant costs and may divert our management and business development resources. Any inability to manage growth could delay the execution of our business plans or disrupt our operations.

Future acquisitions or strategic alliances could disrupt our business and harm our financial condition and results of operations.

We may acquire additional businesses, technologies or assets, form strategic alliances or create joint ventures with third parties that we believe will complement or augment our existing business. If we acquire businesses with promising markets or technologies, we may not be able to realize the benefit of acquiring such businesses if we are unable to successfully integrate them with our existing operations and company culture. We may encounter numerous difficulties in developing, manufacturing and marketing any new products or product candidates resulting from a strategic alliance or acquisition that may delay or prevent us from realizing their expected benefits or enhancing our business. We cannot assure you that, following any such acquisition, we will achieve the expected synergies to justify the transaction. The risks we face in connection with acquisitions include:

- diversion of management time and focus from operating our business to addressing acquisition integration challenges;
- coordination of research and development efforts;
- retention of key employees from the acquired company;
- changes in relationships with collaborators as a result of product acquisitions or strategic positioning resulting from the acquisition;
- cultural challenges associated with integrating employees from the acquired company into our organization;
- the need to implement or improve controls, procedures and policies at a business that prior to the acquisition may have lacked sufficiently effective controls, procedures and policies;
- liability for activities of the acquired company before the acquisition, including intellectual property infringement claims, violation of laws, commercial disputes, tax liabilities and other known liabilities;
- unanticipated write-offs or charges; and
- litigation or other claims in connection with the acquired company, including claims from terminated employees, customers, former stockholders or other third parties.

Our failure to address these risks or other problems encountered in connection with our past or future acquisitions or strategic alliances could cause us to fail to realize the anticipated benefits of these transactions,

cause us to incur unanticipated liabilities and harm the business generally. There is also a risk that future acquisitions will result in the incurrence of debt, contingent liabilities, amortization expenses or incremental operating expenses, any of which could harm our financial condition or results of operations.

Our internal computer systems, or those of our collaborators or other contractors or consultants, may fail or suffer security breaches, which could result in a material disruption of our product development programs.

Our internal computer systems and those of any collaborators, contractors or consultants are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. If our privacy protection, data protection, or information security measures (or those of any third parties that handle our sensitive information) are inadequate or are breached as a result of third-party action, employee or contractor error, malfeasance, malware, system error, software bugs or defects in our products, trickery, process failure or otherwise, third parties gaining access to employee accounts using stolen or inferred credentials, computer malware, viruses, spamming, phishing attacks or other means, and deliberate attacks and attempts to gain unauthorized access to computer systems and networks, and, as a result, there is improper disclosure of, or someone obtains unauthorized access to sensitive information, including personally identifiable information or protected health information, or if we suffer a ransomware or advanced persistent threat attack, or if any of the foregoing is reported or perceived to have occurred, our reputation and business could be damaged, we could incur significant costs associated with remediation and the implementation of additional security measures, we may incur significant liability and financial loss, and be subject to regulatory scrutiny, investigations, proceedings, lawsuits and penalties.

Cyber-attacks are increasing in their frequency, sophistication and intensity, and have become increasingly difficult to detect. Cyber-attacks could include the deployment of harmful malware, ransomware, denial-of-service attacks, unauthorized access to or deletion of files, social engineering and other means to affect service reliability and threaten the confidentiality, integrity and availability of information. We cannot guarantee that the measures we have taken to date, and actions we may take in the future, will be sufficient to remediate any future breaches. Cyber-attacks also could include phishing attempts or e-mail fraud to cause payments or information to be transmitted to an unintended recipient.

To the extent we experience a material system failure, accident, cyber-attack or security breach, it could result in a material disruption of our development programs and our business operations, whether due to a loss of our trade secrets or other proprietary information or other similar disruptions. For example, the loss of clinical trial data from completed or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability, our competitive position could be harmed and the further development and commercialization of our product candidates could be delayed.

While we have not experienced any material system failures, accidents or security breaches to date, if such an event were to occur and cause interruptions in our operations, it could result in a disruption of our drug development programs. These threats pose a risk to the security of our, our collaborators', our CROs', third-party logistics and service providers', distributors' and other contractors' and consultants' systems and networks, and the confidentiality, availability and integrity of our data. There can be no assurance that we will be successful in preventing cyber-attacks or successfully mitigating their effects. Any cyber-attack, data breach or destruction, inaccessibility, or loss of data could result in a violation of applicable U.S. and international privacy, data protection and other laws, and subject us to litigation and governmental investigations and proceedings by federal, state and local regulatory entities in the United States and by international regulatory entities, resulting in exposure to material civil and/or criminal liability. Further, our general liability insurance and corporate risk program may not cover all potential claims to which we are exposed and may not be

adequate to indemnify us for all liability that may be imposed; and could have a material adverse effect on our business and prospects. For example, the loss of clinical trial data from completed, ongoing or planned clinical trials for any of our product candidates could result in delays in our development and regulatory approval efforts and significantly increase our costs to recover or reproduce the data. In addition, we may suffer reputational harm or face litigation or adverse regulatory action as a result of cyber-attacks or other data security breaches and may incur significant additional expense to implement further data protection measures.

Risks related to our common stock and this offering

After this offering, our executive officers, directors and principal stockholders, if they choose to act together, will continue to have the ability to control all matters submitted to stockholders for approval.

Upon the closing of this offering, our executive officers and directors and our stockholders who owned more than 5% of our outstanding common stock before this offering will, in the aggregate, beneficially own shares representing approximately 47.2% of our capital stock (or 45.4% if the underwriters exercise their option to purchase additional shares in full). Further, certain of our executive officers, employees and other persons associated with us have indicated an interest to purchase an aggregate of up to 3.0% of the common stock in this offering at the initial public offering price in a directed share program. In addition, the cornerstone investors have indicated an interest, severally and not jointly, in purchasing up to an aggregate of $75 million in shares in this offering. Because this indication of interest is not a binding agreement or commitment to purchase, the cornerstone investors may determine to purchase more, less or no shares in this offering, or the underwriters may determine to sell more, less or no shares to any of the cornerstone investors. If the cornerstone investors are allocated and purchase all or a portion of such shares, such purchases may increase the percentage of shares owned by our principal stockholders. As a result, if these stockholders were to choose to act together, they would effectively be able to control all matters submitted to our stockholders for approval, as well as our management and affairs. For example, these persons, if they choose to act together, would effectively control the election of directors and approval of any merger, consolidation or sale of all or substantially all of our assets.

This concentration of ownership control may:

- delay, defer or prevent a change in control;
- entrench our management and board of directors; or
- delay or prevent a merger, consolidation, takeover or other business combination involving us that other stockholders may desire.

Provisions in our corporate charter documents and under Delaware law could make an acquisition of our company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current directors and members of management.

Provisions in our certificate of incorporation and our bylaws that will become effective upon the closing of this offering may discourage, delay or prevent a merger, acquisition or other change in control of our company that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current

management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions:

- establish a classified board of directors such that only one of three classes of directors is elected each year;
- allow the authorized number of our directors to be changed only by resolution of our board of directors;
- limit the manner in which stockholders can remove directors from our board of directors;
- establish advance notice requirements for stockholder proposals that can be acted on at stockholder meetings and nominations to our board of directors;
- require that stockholder actions must be effected at a duly called stockholder meeting and prohibit actions by our stockholders by written consent;
- limit who may call stockholder meetings;
- authorize our board of directors to issue preferred stock without stockholder approval, which could be used to institute a “poison pill” that would work to dilute the stock ownership of a potential hostile acquirer, effectively preventing acquisitions that have not been approved by our board of directors; and
- require the approval of the holders of at least 75% of the votes that all our stockholders would be entitled to cast to amend or repeal specified provisions of our certificate of incorporation or bylaws that will become effective upon the closing of this offering.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, or the DGCL, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

If you purchase shares of common stock in this offering, you will suffer immediate dilution of your investment.

The initial public offering price of our common stock will be substantially higher than the pro forma as adjusted net tangible book value per share of our common stock. Therefore, if you purchase shares of our common stock in this offering, you will pay a price per share that substantially exceeds our pro forma as adjusted net tangible book value per share after this offering. To the extent outstanding options are exercised, you will incur further dilution. Based on the initial public offering price of $19.00 per share, you will experience immediate dilution of $10.41 per share, representing the difference between our pro forma as adjusted net tangible book value per share, after giving effect to this offering, and the assumed initial public offering price.

Participation in this offering by the cornerstone investors could reduce the public float for our shares of common stock.

The cornerstone investors have indicated an interest, severally and not jointly, in purchasing up to an aggregate of $75 million in shares in this offering at the initial public offering price. Because this indication of interest is not a binding agreement or commitment to purchase, the cornerstone investors may determine to purchase more, less or no shares in this offering or the underwriters may determine to sell more, less or no shares to any of the cornerstone investors. If the cornerstone investors are allocated all or a portion of the shares in which they have indicated an interest in this offering or more, and purchase any such shares, such purchase could reduce the available public float for our shares if the cornerstone investors hold these shares long term.

An active trading market for our common stock may not develop and, as a result, it may be difficult for you to sell your shares of our common stock.

Prior to this offering, there has been no public market for our common stock. The initial public offering price for our common stock will be determined through negotiations with the underwriters. Although our common stock has been approved for listing on the Nasdaq Global Select Market, an active trading market for our shares may never develop or be sustained following this offering. If an active market for our common stock does not develop, it may be difficult for you to sell shares you purchase in this offering without depressing the market price for the shares or at all.

If securities analysts do not publish or cease publishing research or reports or publish misleading, inaccurate or unfavorable research about our business or if they publish negative evaluations of our stock, the price and trading volume 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 would likely decrease. Even if we do obtain analyst coverage, if one or more of the analysts covering our business downgrade their evaluations of our stock or publish inaccurate or unfavorable research about our business, or provides more favorable relative recommendations about our competitors, 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 and trading volume to decline.

The price of our common stock may be volatile and fluctuate substantially, which could result in substantial losses for purchasers of our common stock in this offering.

Our stock price is likely to be volatile. The stock market in general and the market for smaller biopharmaceutical companies in particular have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, you may not be able to sell your common stock at or above the initial public offering price. The market price for our common stock may be influenced by many factors, including:

- timing and results of or developments in preclinical studies and clinical trials of our product candidates or those of our competitors or potential collaborators;
- adverse regulatory decisions, including failure to receive regulatory approvals for any of our product candidates;
- our success in commercializing our product candidates, if and when approved;
- developments with respect to competitive products or technologies;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents or other intellectual property or proprietary rights;
- the recruitment or departure of key personnel;
- the level of expenses related to any of our product candidates or clinical development programs;
- the results of our efforts to discover, develop, acquire or in-license products, product candidates, technologies, the costs of commercializing any such products and the costs of development of any such product candidates or technologies;

- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or the financial results of companies that are perceived to be similar to us;
- sales of common stock by us, our executive officers, directors or principal stockholders, or others;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors;
- general economic, industry and market conditions, such as the impact of the COVID-19 pandemic on our industry and market conditions; and
- the other factors described in this “Risk factors” section.

In the past, following periods of volatility in the market price of a company’s securities, securities class-action litigation has often been instituted against that company. Any lawsuit to which we are a party, with or without merit, may result in an unfavorable judgment. We also may decide to settle lawsuits on unfavorable terms. Any such negative outcome could result in payments of substantial damages or fines, damage to our reputation or adverse changes to our offerings or business practices. Such litigation may also cause us to incur other substantial costs to defend such claims and divert management’s attention and resources. Furthermore, negative public announcements of the results of hearings, motions or other interim proceedings or developments could have a negative effect on the market price of our common stock.

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

Our management will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. The failure by our management to apply these funds effectively could result in financial losses that could have a material adverse effect on our business, cause the price of our common stock to decline and delay the development of our product candidates. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value.

A significant portion of our total outstanding shares are eligible to be sold into the market in the near future, which could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock. After this offering, we will have 46,110,444 shares of common stock outstanding based on the number of shares outstanding as of May 31, 2021. This includes the 14,035,789 shares that we are selling in this offering, which may be resold in the public market immediately without restriction, unless purchased by our affiliates or existing stockholders. The remaining shares are currently restricted as a result of securities laws or lock-up agreements but will become eligible to be sold at various times after the offering. Moreover, beginning 180 days after the completion of this offering, holders of an aggregate of 27,996,998 shares of our common stock will have rights, subject to specified 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 intend to register all shares of 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, subject to volume limitations applicable to affiliates and the lock-up agreements described in the “Underwriting” section of this prospectus.

We are an "emerging growth company" and a "smaller reporting company," and the reduced disclosure requirements applicable to emerging growth companies and smaller reporting companies may make our common stock less attractive to investors.

We are an "emerging growth company," or EGC, as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. We may remain an EGC until the end of the fiscal year in which the fifth anniversary of this offering occurs, although if the market value of our common stock that is held by non-affiliates exceeds $700 million as of any June 30 before that time or if we have annual gross revenues of $1.07 billion or more in any fiscal year, we would cease to be an EGC as of December 31 of the applicable year. We also would cease to be an EGC if we issue more than $1 billion of non-convertible debt over a three-year period. For so long as we remain an EGC, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not EGCs. These exemptions include:

- being permitted to provide only two years of audited financial statements in this prospectus, in addition to any required unaudited interim financial statements, with correspondingly reduced "Management's Discussion and Analysis of Financial Condition and Results of Operations" disclosure;
- not being required to comply with the auditor attestation requirements in the assessment of our internal control over financial reporting;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements;
- reduced disclosure obligations regarding executive compensation; 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.

Even after we no longer qualify as an emerging growth company, we may continue to qualify as a smaller reporting company, which would allow us to take advantage of many of the same exemptions from disclosure requirements, including reduced disclosure obligations regarding executive compensation. In addition, if we are a smaller reporting company with less than $100 million in annual revenue, we would not be required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, or Section 404.

We may choose to take advantage of some, but not all, of the available exemptions. We have taken advantage of reduced reporting obligations in this prospectus. In particular, in this prospectus, we have provided only two years of audited financial statements and have not included all of the executive compensation related information that would be required if we were not an EGC.

We cannot predict whether investors will find our common stock less attractive if we rely on certain or all of 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.

In addition, the JOBS Act permits an EGC to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies until those standards would otherwise apply to private companies. We have elected not to "opt out" of such extended transition period, which means that when a standard is issued or revised and it has different application dates for public or private companies, we will adopt the new or revised standard at the time private companies adopt the new or revised standard and will do so until such time that we either (i) irrevocably elect to "opt out" of such extended transition period or (ii) no longer qualify as an EGC or a smaller reporting company.

We will incur increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives and corporate governance practices.

As a public company, and particularly after we are no longer an EGC or a smaller reporting company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. The Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of the Nasdaq Global Select Market and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs, particularly as we hire additional financial and accounting employees to meet public company internal control and financial reporting requirements, and will make some activities more time-consuming and costly. For example, we expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance, which in turn could make it more difficult for us to attract and retain qualified members of our board of directors.

We are evaluating these rules and regulations and cannot predict or estimate the amount of additional costs we may incur or the timing of such costs. These rules and regulations are often subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices.

Pursuant to Section 404, we will be required to furnish a report by our management on our internal control over financial reporting. However, while we remain an EGC or a smaller reporting company with less than $100 million in annual revenue, we will not be required to include an attestation report on internal control over financial reporting issued by our independent registered public accounting firm. To achieve compliance with Section 404 within the prescribed period, we will be engaged in a process to document and evaluate our internal control over financial reporting, which is both costly and challenging. In this regard, we will need to continue to dedicate internal resources, including through hiring additional financial and accounting personnel, potentially engage outside consultants and adopt a detailed work plan to assess and document the adequacy of internal control over financial reporting, continue steps to improve control processes as appropriate, validate through testing that controls are functioning as documented and implement a continuous reporting and improvement process for internal control over financial reporting. Despite our efforts, there is a risk that we will not be able to conclude, within the prescribed timeframe or at all, that our internal control over financial reporting is effective as required by Section 404. If we identify one or more material weaknesses in our internal control over financial reporting, it could result in an adverse reaction in the financial markets due to a loss of confidence in the reliability of our financial statements.

Because we do not anticipate paying any cash dividends on our capital stock in the foreseeable future, capital appreciation, if any, will be your sole source of gain.

We have never declared or paid cash dividends on our capital stock. We currently intend to retain all of our future earnings, if any, to finance the growth and development of our business. As a result, capital appreciation, if any, of our common stock will be your sole source of gain for the foreseeable future.

Our certificate of incorporation that will become effective upon the closing of this offering designates the Court of Chancery of the State of Delaware and the federal district courts of the United States of America as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders,

which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers and employees.

Our certificate of incorporation that will become effective upon the closing of this offering provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or, if the Court of Chancery of the State of Delaware does not have jurisdiction, the federal district court for the District of Delaware) will be the sole and 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 a fiduciary duty owed by any of our directors, officers, employees or stockholders to our company or our stockholders;
- any action asserting a claim arising pursuant to any provision of the DGCL or as to which the DGCL confers jurisdiction on the Court of Chancery of the State of Delaware; or
- any action asserting a claim arising pursuant to any provision of our certificate of incorporation or bylaws (in each case, as they may be amended from time to time) or governed by the internal affairs doctrine.

These choice of forum provisions will not apply to suits brought to enforce a duty or liability created by the Securities Exchange Act of 1934, as amended, or the Exchange Act. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our certificate of incorporation that will become effective upon the closing of this offering provides that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States of America shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolution of any claims arising under the Securities Act. 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. In such instance, we would expect to vigorously assert the validity and enforceability of the exclusive forum provisions of our certificate of incorporation. This may require significant additional costs associated with resolving such action in other jurisdictions and there can be no assurance that the provisions will be enforced by a court in those other jurisdictions.

These exclusive forum provisions may limit the ability of our stockholders to bring a claim in a judicial forum that such stockholders find favorable for disputes with us or our directors, officers or employees, which may discourage such lawsuits against us and our directors, officers and employees. If a court were to find either exclusive forum provision contained in our certificate of incorporation to be inapplicable or unenforceable in an action, we may incur further significant additional costs associated with resolving such action in other jurisdictions, all of which could materially adversely affect our business, financial condition and results of operations.

General risk factors

Our disclosure controls and procedures may not prevent or detect all errors or acts of fraud.

Upon completion of this offering, we will become subject to certain reporting requirements of the Exchange Act. Our disclosure controls and procedures are designed to reasonably assure that information required to be disclosed by us in reports we file or submit under the Exchange Act is accumulated and communicated to management, recorded, processed, summarized, and reported within the time periods specified in the rules and

forms of the SEC. We believe that any disclosure controls and procedures or internal controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people, or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements or insufficient disclosures due to error or fraud may occur and not be detected.

Changes in tax laws or in their implementation or interpretation may adversely affect our business and financial condition.

Recent changes in tax law may adversely affect our business or financial condition. On December 22, 2017, the U.S. government enacted the Tax Act, which significantly reformed the Code. The Tax Act, among other things, contains significant changes to corporate taxation, including reducing the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limiting the tax deduction for net interest expense to 30% of adjusted taxable income (except for certain small businesses), limiting the deduction for NOLs arising in taxable years beginning after December 31, 2017 to 80% of current year taxable income and elimination of NOL carrybacks for losses arising in taxable years ending after December 31, 2017 (though any such NOLs may be carried forward indefinitely), imposing a one-time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, eliminating U.S. tax on foreign earnings (subject to certain important exceptions), allowing immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits.

As part of Congress' response to the COVID-19 pandemic, the Families First Coronavirus Response Act, or FFCR Act, was enacted on March 18, 2020, and the CARES Act was enacted on March 27, 2020. Both contain numerous tax provisions. In particular, the CARES Act retroactively and temporarily (for taxable years beginning before January 1, 2021) suspends application of the 80%-of-income limitation on the use of NOLs, which was enacted as part of the Tax Act. It also provides that NOLs arising in any taxable year beginning after December 31, 2017, and before January 1, 2021 are generally eligible to be carried back up to five years. The CARES Act also temporarily (for taxable years beginning in 2019 or 2020) relaxes the limitation of the tax deductibility for net interest expense by increasing the limitation from 30% to 50% of adjusted taxable income.

Regulatory guidance under the Tax Act, the FFCR Act and the CARES Act is and continues to be forthcoming, and such guidance could ultimately increase or lessen their impact on our business and financial condition. It is also likely that Congress will enact additional legislation in connection with the COVID-19 pandemic, some of which could have an impact on us. In addition, it is uncertain if and to what extent various states will conform to the Tax Act, the FFCR Act or the CARES Act. We urge prospective investors in our common stock to consult with their legal and tax advisors with respect to any recently enacted tax legislation, or proposed changes in law, and the potential tax consequences of investing in or holding our common stock.

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

Our results of operations could be adversely affected by general conditions in the global economy and in the global financial markets. For example, the 2008 global financial crisis caused extreme volatility and disruptions in the capital and credit markets. A severe or prolonged economic downturn resulting from the COVID-19 pandemic could result in a variety of risks to our business, including weakened demand for any product candidates we may develop and our ability to raise additional capital when needed on acceptable terms, if at all. A weak or declining economy could also strain our suppliers, possibly resulting in supply disruption. If the current equity and credit markets deteriorate, it may make any necessary debt or equity financing more

difficult, more costly, and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could impair our ability to achieve our growth strategy, could harm our financial performance and stock price and could require us to delay or abandon clinical development plans. In addition, there is a risk that our current or future service providers, manufacturers or other collaborators may not survive such difficult economic times, which could directly affect our ability to attain our operating goals on schedule and on budget. We cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

Cautionary note regarding forward-looking statements and industry data

This prospectus contains forward-looking statements that involve substantial risks and uncertainties. All statements, other than statements of historical fact, contained in this prospectus, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans and objectives of management, are forward-looking statements. The words “anticipate,” “believe,” “contemplate,” “continue” “could,” “estimate,” “expect,” “intend,” “may,” “might,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “will,” “would,” or the negative of these words or other similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

The forward-looking statements in this prospectus include, among other things, statements about:

- the initiation, timing, progress and results of our research and development programs and preclinical studies and clinical trials;
- the impact of the COVID-19 pandemic and our response to the pandemic;
- our estimates regarding expenses, future revenue, capital requirements, need for additional financing and the period over which we believe that the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, will be sufficient to fund our operating expenses and capital expenditure requirements;
- the timing of and our ability to submit applications for and obtain and maintain regulatory approvals for our current and future product candidates;
- the potential therapeutic attributes and advantages of our current and future product candidates;
- our expectations about the translatability of NHP results into humans;
- our plans to develop and, if approved, subsequently commercialize any product candidates we may develop;
- the rate and degree of market acceptance and clinical utility of our products, if approved;
- our estimates regarding the addressable patient population and potential market opportunity for our current and future product candidates;
- our commercialization, marketing and manufacturing capabilities and strategy;
- our expectations regarding our ability to obtain and maintain intellectual property protection;
- our ability to identify additional products, product candidates or technologies with significant commercial potential that are consistent with our commercial objectives;
- our expectations related to the use of proceeds from this offering;
- the impact of government laws and regulations;
- our competitive position and expectations regarding developments and projections relating to our competitors and any competing therapies that are or become available;
- developments relating to our competitors and our industry; and
- our ability to establish and maintain collaborations or obtain additional funding.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important factors in the cautionary statements included in this prospectus, particularly in the “Risk factors” section, that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Moreover, we operate in a competitive and rapidly changing environment. New risk factors and uncertainties may emerge from time to time, and it is not possible for management to predict all risk factors and uncertainties. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, collaborations, joint ventures or investments we may make or enter into.

You should read this prospectus and the documents that we reference in this prospectus and have filed as exhibits to the registration statement of which this prospectus is a part completely and with the understanding that our actual future results may be materially different from what we expect. The forward-looking statements contained in this prospectus are made as of the date of this prospectus, and we do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by applicable law.

This prospectus includes statistical and other industry and market data that we obtained from independent industry publications and research, surveys and studies conducted by independent third parties as well as our own estimates of the prevalence of certain diseases and conditions. The market data used in this prospectus involves a number of assumptions and limitations, and you are cautioned not to give undue weight to such data. Industry publications and third-party research, surveys and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. Our estimates of the patient population with the potential to benefit from treatment with any product candidates we may develop include several key assumptions based on our industry knowledge, industry publications, third-party research and other surveys, which may be based on a small sample size and may fail to accurately reflect the addressable patient population.

Use of proceeds

We estimate that the net proceeds from our issuance and sale of 14,035,789 shares of our common stock in this offering will be approximately $244.6 million, after deducting underwriting discounts and commissions and estimated offering expenses payable by us. If the underwriters exercise their option to purchase additional shares of our common stock in full, we estimate that the net proceeds from this offering will be approximately $281.8 million.

As of March 31, 2021, we had cash, cash equivalents and marketable securities of $149.5 million. We currently estimate that we will use the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, as follows:

- approximately $84.0 million for continued research and development of VERVE-101, including completion of IND-enabling studies and initiation of Phase 1b clinical trials;
- approximately $111.0 million for continued research and development of our ANGPTL3 program, including preclinical research, completion of IND-enabling studies and initiation of Phase 1 clinical trials;
- approximately $65.0 million for research and development to support new programs and optimization of existing technology, including new targets, novel LNP delivery technology and novel process development to enable manufacturing at scale; and
- the remainder for working capital and other general corporate purposes.

We believe opportunities may exist from time to time to expand our current business through acquisitions of complementary companies, products or technologies. While we have no current agreements, commitments or understandings for any specific acquisitions at this time, we may also use a portion of the net proceeds for these purposes.

Our expected use of net proceeds from this offering and our existing cash, cash equivalents and marketable securities represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. As a result, we cannot predict with any certainty our use of the net proceeds from this offering or the amounts that we will actually spend on each area of use set forth above. The amounts and timing of our actual expenditures may vary significantly depending on numerous factors, including results from our research and development efforts, the timing and success of our preclinical studies and clinical trials and the timing and outcome of regulatory submissions, as well as any collaborations that we may enter into with third parties for our product candidates, and any unforeseen cash needs.

Based on our current plans, we estimate that the anticipated net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, will enable us to fund our operating expenses and capital expenditure requirements into 2024. In particular, we expect that the anticipated net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, will enable us to complete our ongoing and planned IND-enabling studies for VERVE-101 and our ANGPTL3 program and to initiate Phase 1 clinical trials for each of these programs. However, we do not expect these funds will be sufficient to complete the clinical development of, or commercialize, any of our product candidates or programs. We have based our estimates on assumptions that may prove to be wrong. We could use our available capital resources sooner than we currently expect, in which case we would need to obtain additional funding, 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.

Our management will retain broad discretion over the allocation of the net proceeds from this offering. Pending our use of the net proceeds from this offering, we intend to invest the net proceeds in a variety of capital preservation investments, including short-term, investment-grade, interest-bearing instruments and U.S. government securities.

Dividend policy

We have never declared or paid cash dividends on our common stock. We currently intend to retain all available funds and any future earnings 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 to declare and pay dividends will be made at the discretion of our board of directors and will depend on then-existing conditions, including our results of operations, financial condition, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant.

Capitalization

The following table summarizes our cash, cash equivalents and marketable securities and capitalization as of March 31, 2021:

- on an actual basis;
- on a pro forma basis to give effect to (i) our issuance of an aggregate of 878,098 shares of common stock to The Broad Institute and the President and Fellows of Harvard College upon the closing of this offering pursuant to our Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under "Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College," (ii) the automatic conversion of all outstanding shares of our convertible preferred stock into an aggregate of 27,720,923 shares of common stock upon the closing of this offering and (iii) the filing and effectiveness of our restated certificate of incorporation in connection with the closing of this offering; and
- on a pro forma as adjusted basis, to give further effect to our issuance and sale of 14,035,789 shares of our common stock in this offering at the initial public offering price of $19.00 per share, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

You should read the information in this table together with our consolidated financial statements and the related notes appearing elsewhere in this prospectus and the "Management's discussion and analysis of financial condition and results of operations" sections of this prospectus.

	As of March 31, 2021		
	Actual	Pro forma	Pro forma as adjusted
	(in thousands, except share and per share data)		
Cash, cash equivalents and marketable securities	$149,523	$149,523	$ 394,289
Convertible preferred stock, $0.001 par value: 256,682,054 shares authorized and 256,682,054 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	$218,919	$ —	$ —
Stockholders' (deficit) equity:			
Preferred stock, $0.001 par value: no shares authorized, issued or outstanding, actual; 5,000,000 shares authorized and no shares issued or outstanding, pro forma and pro forma as adjusted	—	—	—
Common stock, $0.001 par value; 355,000,000 shares authorized, 3,172,168 shares issued and 2,768,943 shares outstanding, actual; 200,000,000 shares authorized, 31,771,189 shares issued and 31,367,964 shares outstanding, pro forma; 200,000,000 shares authorized, 45,806,978 shares issued and 45,403,753 shares outstanding, pro forma as adjusted	3	32	45
Additional paid-in capital	3,358	238,932	483,531
Accumulated other comprehensive income	7	7	7
Accumulated deficit	(79,799)	(89,963)	(89,963)
Total stockholders' (deficit) equity	(76,431)	149,008	393,620
Total capitalization	$142,488	$149,008	$ 393,620

The table above excludes:

- 5,188,558 shares of common stock issuable upon the exercise of stock options outstanding as of March 31, 2021 under our 2018 Equity Incentive Plan, as amended, or the 2018 Plan, at a weighted average exercise price of $3.80 per share;
- an additional 380,690 shares of common stock issuable upon the exercise of stock options granted after March 31, 2021, at an exercise price of $8.98 per share;
- 1,536,893 shares of common stock available for future issuance as of March 31, 2021 under our 2018 Plan (which does not account for stock options to purchase an aggregate of 380,690 shares of common stock at an exercise price of $8.98 per share, granted after March 31, 2021); and
- 3,466,530 and 433,316 additional shares of our common stock available for future issuance under our 2021 Stock Incentive Plan, of which our board of directors has granted options to purchase an aggregate of 464,519 shares of common stock to certain of our employees, executive officers and non-employee directors effective upon the commencement of trading of our common stock on the Nasdaq Stock Market with an exercise price per share equal to the initial public offering price in this offering, and our Amended and Restated 2021 Employee Stock Purchase Plan, respectively, as well as any automatic increases in the number of shares of common stock reserved for future issuance under these plans.

Dilution

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

Our historical net tangible book value (deficit) as of March 31, 2021 was $(76.4) million, or $(24.09) per share of our common stock. Our historical net tangible book value (deficit) is the amount of our total tangible assets less our total liabilities and the carrying value of our convertible preferred stock, which is not included within stockholders' deficit. Historical net tangible book value (deficit) per share represents historical net tangible book value (deficit) divided by the 3,172,168 shares of our common stock outstanding as of March 31, 2021, which includes 403,224 shares of unvested restricted stock subject to a repurchase option.

Our pro forma net tangible book value (deficit) as of March 31, 2021 was $149.0 million, or $4.69 per share of our common stock. Pro forma net tangible book value represents the amount of our total tangible assets less our total liabilities, and gives effect to (i) our issuance of an aggregate of 878,098 shares of common stock to The Broad Institute and the President and Fellows of Harvard College upon the closing of this offering pursuant to our Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under "Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College " and (ii) the automatic conversion of all outstanding shares of our convertible preferred stock into an aggregate of 27,720,923 shares of common stock upon the closing of this offering. Pro forma net tangible book value per share represents pro forma net tangible book value divided by the total number of shares outstanding as of March 31, 2021, after giving effect to the pro forma adjustments described above.

After giving further effect to our issuance and sale of 14,035,789 shares of our common stock in this offering at the initial public offering price of $19.00 per share, and after deducting underwriting discounts and commissions and estimated offering expenses payable by us, our pro forma as adjusted net tangible book value as of March 31, 2021 would have been $393.6 million, or $8.59 per share. This represents an immediate increase in pro forma as adjusted net tangible book value per share of $3.90 to existing stockholders and an immediate dilution of $10.41 in pro forma as adjusted net tangible book value per share to new investors purchasing common stock in this offering. Dilution per share to new investors is determined 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 new investors. The following table illustrates this dilution on a per share basis:

Initial public offering price per share		$ 19.00
Historical net tangible book value (deficit) per share as of March 31, 2021	$ (24.09)	
Increase per share attributable to the pro forma adjustments described above	28.78	
Pro forma net tangible book value (deficit) per share as of March 31, 2021	4.69	
Increase in pro forma as adjusted net tangible book value per share attributable to new investors purchasing shares of common stock in this offering	3.90	
Pro forma as adjusted net tangible book value per share immediately after this offering		8.59
Dilution per share to new investors purchasing shares of common stock in this offering		$ 10.41

If the underwriters exercise their option to purchase additional shares in full, our pro forma as adjusted net tangible book value per share after this offering would be $8.99, representing an immediate increase in pro forma as adjusted net tangible book value per share of $0.40 to existing stockholders and immediate dilution in pro forma as adjusted net tangible book value per share of $10.01 to new investors purchasing shares of

common stock in this offering, based on the initial public offering price of $19.00 per share, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

The following table summarizes, as of March 31, 2021, on the pro forma as adjusted basis described above, the total number of shares of common stock purchased from us on an as converted to common stock basis, the total consideration paid or to be paid and the average price per share paid or to be paid by existing stockholders and by new investors in this offering at the initial public offering price of $19.00 per share, before deducting underwriting discounts and commissions and estimated offering expenses payable by us. As the table shows, new investors purchasing shares of common stock in this offering will pay an average price per share substantially higher than our existing stockholders paid.

	Shares Purchased		Total Consideration		Average Price Per Share
	Number	Percent	Amount	Percentage	
Existing stockholders	31,771,189	69.4%	$222,280	45.5%	$ 7.00
New investors	14,035,789	30.6	266,680	54.5	19.00
Total	45,806,978	100.0%	$488,960	100.0%	

The table above assumes no exercise of the underwriters' option to purchase additional shares in this offering. If the underwriters exercise their option to purchase additional shares in full, the number of shares of our common stock held by existing stockholders would be reduced to 66.3% of the total number of shares of our common stock outstanding after this offering, and the number of shares of common stock held by new investors purchasing shares of common stock in this offering would be increased to 33.7% of the total number of shares of our common stock outstanding after this offering.

The tables and discussion above are based on the number of shares of our common stock outstanding as of March 31, 2021, which include 403,224 shares of unvested restricted stock subject to a repurchase option and exclude:

- 5,188,558 shares of common stock issuable upon the exercise of stock options outstanding as of March 31, 2021 under our 2018 Plan at a weighted average exercise price of $3.80 per share;
- an additional 380,690 shares of common stock issuable upon the exercise of stock options granted after March 31, 2021, at an exercise price of $8.98 per share;
- 1,536,893 shares of common stock available for future issuance as of March 31, 2021 under our 2018 Plan (which does not account for stock options to purchase an aggregate of 380,690 shares of common stock at an exercise price of $8.98 per share, granted after March 31, 2021); and
- 3,466,530 and 433,316 additional shares of our common stock available for future issuance under our 2021 Stock Incentive Plan, of which our board of directors has granted options to purchase an aggregate of 464,519 shares of common stock to certain of our employees, executive officers and non-employee directors effective upon the commencement of trading of our common stock on the Nasdaq Stock Market with an exercise price per share equal to the initial public offering price in this offering, and our Amended and Restated 2021 Employee Stock Purchase Plan, respectively, as well as any automatic increases in the number of shares of common stock reserved for future issuance under these plans.

To the extent stock options are issued and exercised under our equity incentive plans, or we issue additional shares of common stock in the future, there will be further dilution to investors purchasing shares of common stock 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.

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 appearing 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 entitled "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. You should carefully read the section entitled "Risk factors" to gain an understanding of the important factors that could cause actual results to differ materially from our forward- looking statements. Please also see the section entitled "Cautionary note regarding forward-looking statements and industry data."

Overview

We are a genetic medicines company pioneering a new approach to the care of cardiovascular disease, or CVD, transforming treatment from chronic management to single-course gene editing medicines. We believe that single-course treatments could provide substantial health benefits that are sustained throughout the lifetimes of patients with or at risk for atherosclerotic cardiovascular disease, or ASCVD, the most common form of CVD.

We were incorporated in March 2018 and commenced operations shortly thereafter. Since our inception, we have devoted substantially all of our resources to building our base editing technology and advancing development of our portfolio of programs, establishing and protecting our intellectual property, conducting research and development activities, organizing and staffing our company, business planning, raising capital and providing general and administrative support for these operations. To date, we have financed our operations primarily through the sales of our Series A convertible preferred stock, or the Series A Preferred Stock, Series A-2 convertible preferred stock, or the Series A-2 Preferred Stock, and Series B convertible preferred stock, or the Series B Preferred Stock and, together with the Series A Preferred Stock and the Series A-2 Preferred Stock, the Preferred Stock. Through March 31, 2021, we had raised $216.5 million in gross proceeds from sales of our Preferred Stock.

We are a development-stage company, and all of our programs are at a preclinical stage of development. To date, we have not generated any revenue and do not expect to generate revenue from the sale of products for the foreseeable future. Since our inception, we have incurred significant operating losses. Our net losses for the years ended December 31, 2020 and 2019 were $45.7 million and $19.3 million, respectively, and our net loss for the three months ended March 31, 2021 was $13.3 million. As of March 31, 2021, we had an accumulated deficit of $79.8 million.

Our total operating expenses were $40.6 million and $13.6 million for the years ended December 31, 2020 and 2019, respectively, and $14.1 million for the three months ended March 31, 2021. We expect to continue to incur significant expenses and increasing operating losses in connection with ongoing development activities related to our portfolio of programs as we continue our preclinical development of product candidates; advance these product candidates toward clinical development; further develop our base editing technology and manufacturing capabilities; seek to discover and develop additional product candidates; maintain, expand enforcement, defend, and protect our intellectual property portfolio; hire research and development and clinical personnel; ultimately establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain marketing approval; establish a commercial manufacturing source and secure supply chain capacity sufficient to provide commercial quantities of any product candidates for which we

may obtain regulatory approval; and add operational, legal, compliance, financial and management information systems and personnel to support our research, product development, future commercialization efforts and operations as a public company.

As a result, we will need substantial additional funding to support our continuing operations and pursue our strategy. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through a combination of equity offerings, debt financings and other sources of capital, which may include collaborations or licensing arrangements with other companies or other strategic transactions. If we are unable to raise capital or obtain adequate funds when needed or on acceptable terms, we may be required to delay, limit, reduce or terminate our research and development programs or any future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Because of the numerous risks and uncertainties associated with product development, we are unable to predict the timing or amount of increased expenses or when or if we will be able to achieve profitability. Even if we are able to generate revenue from product sales, we may not become profitable. If we fail to become profitable or are unable to sustain profitability on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce or terminate our operations.

As of March 31, 2021, we had cash, cash equivalents and marketable securities of $149.5 million. We believe that the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, will enable us to fund our operating expenses and capital expenditure requirements into 2024. We have based this estimate on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect. To finance our operations beyond that point we will need to raise additional capital, which cannot be assured. See “Liquidity and capital resources.”

Impact of COVID-19 on our business

In March 2020, COVID-19 was declared a global pandemic by the World Health Organization and to date, the COVID-19 pandemic continues to present a substantial public health and economic challenge around the world. The length of time and full extent to which the COVID-19 pandemic may directly or indirectly impact our business, results of operations and financial condition will depend on future developments that are highly uncertain, subject to change and difficult to predict. We, our contract manufacturing organizations, or CMOs, and our contract research organizations, or CROs, experienced temporary reductions in the capacity to undertake research-scale production and to execute some preclinical studies. While these operations have since normalized, we, together with our CMOs and CROs, are closely monitoring the impact of the COVID-19 pandemic on these operations.

We also plan to continue to closely monitor the ongoing impact of the COVID-19 pandemic on our employees and our other business operations. In an effort to provide a safe work environment for our employees, we have, among other things, limited employees in our office and lab facilities to those where on-site presence is needed for their job activities, increased the cadence of sanitization of our office and lab facilities, implemented various social distancing measures in our offices and labs including replacing all in-person meetings with virtual interactions, and are providing personal protective equipment for our employees present in our office and lab facilities. We are continuing to monitor the impact and effects of the COVID-19 pandemic and our response to it, and we expect to continue to take actions as may be required or recommended by government authorities or as we determine are in the best interests of our employees and other business partners in light of the pandemic.

License and collaboration agreements

We have obligations under various license and collaboration agreements to make potentially significant milestone and success payments in the future and to pay royalties on sales of any product candidates covered by those agreements that eventually achieve regulatory approval and commercialization. For information regarding these agreements, See “Business—License and collaboration agreements.”

Components of our results of operations

Revenue

To date, we have not generated any revenue. We do not expect to generate any revenue from the sale of products in the near future and unless and until we successfully complete development and obtain regulatory approval for one or more of our product candidates. If our development efforts for our product candidates are successful and result in regulatory approval or we successfully enter into license or collaboration agreements with third parties, we may generate revenue in the future from product sales, payments from third-party collaboration or license agreements, or any combination thereof.

Operating expenses

Research and development expenses

Research and development expenses consist of costs incurred in performing research and development activities, which include:

- the cost to obtain and maintain licenses to intellectual property, such as those with the President and Fellows of Harvard College, or Harvard, The Broad Institute, Inc., or Broad, Beam Therapeutics Inc., or Beam, Verily Life Sciences LLC and Acuitas Therapeutics, Inc., or Acuitas, and related future payments should certain development and regulatory milestones be achieved;
- personnel-related expenses, including salaries, bonuses, benefits and stock-based compensation for employees engaged in research and development functions;
- expenses incurred in connection with the discovery and preclinical development of our research programs, including under agreements with third parties, such as consultants, contractors and CROs;
- the cost of developing and validating our manufacturing process for use in our preclinical studies and future clinical trials, including the cost of raw materials used in our research and development activities;
- the cost of laboratory supplies and research materials; and
- facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities and insurance.

We expense research and development costs as incurred. Nonrefundable advance payments that we make for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. The prepaid amounts are expensed as the benefits are consumed.

In the early phases of development, our research and development costs are often devoted to proof-of-concept studies that are not necessarily allocable to a specific target; therefore, we have not yet begun tracking our expenses on a program-by-program basis.

Research and development activities are central to our business model. We expect that our research and development expenses will continue to increase for the foreseeable future as we advance our programs and product candidates into and through clinical development, and as we continue to develop additional product

candidates. We also expect our discovery research efforts and our related personnel costs will increase and, as a result, we expect our research and development expenses, including costs associated with stock-based compensation, will increase above historical levels. In addition, we may incur additional expenses related to milestone and royalty payments payable to third parties with whom we may enter into license, acquisition and option agreements to acquire the rights to future product candidates.

At this time, we cannot reasonably estimate or know the nature, timing and costs of the efforts that will be necessary to complete the preclinical and clinical development of, and obtain regulatory approval for, any of our product candidates or programs. The successful development of our product candidates is highly uncertain. This is due to the numerous risks and uncertainties associated with product development, including the following:

- the timing and progress of preclinical and clinical development activities;
- the number and scope of preclinical and clinical programs we decide to pursue;
- raising additional funds necessary to complete preclinical and clinical development of our product candidates;
- the timing of filing and acceptance of investigational new drug applications, or INDs, or comparable foreign applications that allow commencement of future clinical trials for our product candidates;
- the successful initiation, enrollment and completion of clinical trials;
- our ability to achieve positive results from our future clinical programs that support a finding of safety and effectiveness and an acceptable risk-benefit profile in the intended patient populations of any product candidates we may develop;
- our ability to successfully develop, obtain regulatory approval for, and then successfully commercialize, our product candidates for the expected indications and patient populations;
- our ability to hire and retain key research and development personnel;
- the costs associated with the development of any additional product candidates we develop or acquire through collaborations;
- our ability to establish and maintain agreements with third-party manufacturers for clinical supply for our clinical trials and commercial manufacturing, if our product candidates are approved;
- the terms and timing of any existing or future collaboration, license or other arrangement, including the terms and timing of any milestone payments thereunder;
- our ability to establish and obtain intellectual property protection and regulatory exclusivity for our product candidates and enforce and defend our intellectual property rights and claims;
- our ability to commercialize products, if and when approved, whether alone or in collaboration with others;
- our ability to maintain a continued acceptable safety, tolerability and efficacy profile of our product candidates following approval; and
- the effects of the COVID-19 pandemic.

A change in any of these variables with respect to any of our current or future product candidates could significantly change the costs, timing and viability associated with the development of that product candidate. We may never succeed in obtaining regulatory approval for any product candidate we may develop.

General and administrative expenses

General and administrative expenses consist primarily of personnel-related costs, including salaries, benefits and stock-based compensation, for personnel in our executive, intellectual property, business development, and administrative functions. General and administrative expenses also include legal fees relating to intellectual property and corporate matters, professional fees for accounting, auditing, tax and consulting services, insurance costs, travel, and direct and allocated facility-related expenses and other operating costs.

We anticipate that our general and administrative expenses will increase in the future to support increased research and development activities. We also expect to incur increased costs associated with being a public company, including costs of accounting, audit, legal, regulatory and tax-related services associated with maintaining compliance with Nasdaq and SEC requirements, director and officer insurance costs, and investor and public relations costs.

Other income (expense)

Change in fair value of preferred stock tranche liability

Change in fair value of preferred stock tranche liability consists primarily of remeasurement gains or losses associated with changes in the fair value of the tranche rights associated with our Series A Preferred Stock. The preferred stock tranche liability was settled as of December 31, 2020, and therefore, there will be no further remeasurement.

Change in fair value of antidilution rights liability

Change in fair value of antidilution rights liability consists of remeasurement gains or losses associated with changes in the antidilution rights liability associated with our license agreements with Harvard and Broad, or the Harvard/Broad License Agreement, and Broad, or the Broad License Agreement.

The antidilution rights represent the obligation to issue additional shares of common stock to Harvard and Broad following the completion of preferred stock financings and other equity financings, which is expected to be fully satisfied upon the closing of this offering. At the inception of the agreements, the liability for the antidilution rights was recorded at fair value with the cost recorded as research and development expense and will be remeasured at each reporting period with changes recorded in other income (expense) while the instruments are outstanding.

The antidilution rights liability was partially satisfied in 2019 and 2020 and it will be satisfied in full upon the issuance of an aggregate of an additional 878,098 shares of common stock upon the closing of this offering, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under “Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College.”

Change in fair value of success payment liability

We are also obligated to pay to Harvard and Broad tiered success payments in the event our average market capitalization, following the filing of our first Quarterly Report on Form 10-Q, exceeds specified thresholds ascending from a high nine-digit dollar amount to $10.0 billion, or sale of our company for consideration in excess of those thresholds. In the event of a change of control of our company or a sale of our company, we are required to pay any related success payment in cash within a specified period following such event. Otherwise, the success payments may be settled at our option in either cash or shares of our common stock, or a combination of cash and shares of our common stock. The maximum aggregate success payments that could be payable by us is $31.3 million. At inception of the agreements, the success payment liabilities were recorded at

fair value with the cost recorded as research and development expense and will be remeasured at each reporting period with charges recorded in other income (expense) while the instrument is outstanding.

Depending on our valuation, the fair value of the antidilution rights and success payment liabilities, and the corresponding changes in fair value that we record in our statements of operations, could fluctuate significantly from period to period.

Interest and other income (expense), net

Interest and other income primarily consisted of interest earned on our marketable securities and other miscellaneous income and expenses unrelated to our core operations.

Income tax

As of December 31, 2020, we had federal net operating loss, or NOL, carryforwards of $49.2 million and state NOL carryforwards of $41.6 million. The federal NOL carryforwards have an indefinite life and the state NOL carryforwards will start to expire in 2038. We have recorded a full valuation allowance against our net deferred tax assets due to uncertainties as to their ultimate realization. We currently anticipate that there will be no change in our unrecognized tax benefits in the next twelve months. As of December 31, 2020, we had no unrecognized tax benefits.

Results of operations

Comparison of three months ended March 31, 2021 and 2020

The following table summarizes our results of operations for the three months ended March 31, 2021 and 2020:

	Three months ended March 31,		
	2021	2020	Change
	(in thousands)		
Operating expenses:			
Research and development	$ 11,345	$ 6,523	$ 4,822
General and administrative	2,716	846	1,870
Total operating expenses	14,061	7,369	6,692
Other income (expense):			
Change in fair value of preferred stock tranche liability	—	2,507	(2,507)
Change in fair value of antidilution rights liability	396	(882)	1,278
Change in fair value of success payment liability	382	64	318
Interest income and other income (expense), net	20	77	(57)
Total other income (expense)	798	1,766	(968)
Net loss	$(13,263)	$(5,603)	$ (7,660)

Research and development expenses

The following table summarizes our research and development expenses for the three months ended March 31, 2021 and 2020:

	Three months ended March 31,	
	2021	2020
	(in thousands)	
Employee-related expenses	$ 2,693	$ 1,374
Raw material costs and external expenses associated with manufacturing activities, including third-party CMOs	2,395	—
External expenses associated with preclinical studies performed by outside consulting services, including third-party CROs	4,010	2,791
Lab supplies used in research and development activities	731	399
Facility-related costs (including depreciation)	779	357
License and milestone payments	55	1,330
Other research and development costs	682	272
Total research and development expenses	$ 11,345	$ 6,523

Research and development expenses were $11.3 million for the three months ended March 31, 2021, compared to $6.5 million for the three months ended March 31, 2020. The increase of $4.8 million was primarily due to the following:

- an increase in external expenses associated with developing and validating our manufacturing process for use in our preclinical studies and future clinical trials of $2.4 million;
- an increase in external expenses associated with preclinical studies (primarily animal-study costs) performed by outside consulting services, including third-party CROs, of $1.2 million;
- an increase in personnel-related costs of $1.3 million driven by an increase in headcount of employees involved in research and development activities;
- an increase in facility-related costs (including depreciation) and other allocated miscellaneous expenses of $0.4 million due to increased investment in research and development;
- an increase in lab supplies of $0.4 million due to the increased investment in research and development activities;
- an increase in other research and development costs of $0.4 million, primarily due to an increase in professional fees and consulting fees in support of increased investment in research and development activities; and
- a decrease in research and development expense attributed to license and milestone payments of $1.3 million, primarily due to a $1.0 million milestone payment incurred during the three months ended March 31, 2020.

We expect our research and development expenses will continue to increase as we continue our current research programs, initiate new research programs, continue our preclinical development of product candidates and conduct future clinical trials for any of our product candidates.

General and administrative expenses

General and administrative expenses were $2.7 million for the three months ended March 31, 2021, compared to $0.8 million for the three months ended March 31, 2020. The increase of $1.9 million was primarily attributable to the following:

- an increase of $1.2 million in personnel, facility and other expenses stemming from an increase in headcount to support our growth;
- an increase of $0.5 million in legal and professional service fees, primarily due to increased professional fees for audit, tax and consulting services; and
- an increase in other miscellaneous expenses of $0.2 million.

Other income (expense)

Change in fair value of preferred stock tranche liability

The change in fair value of the preferred stock tranche liability was due to the modification of the remaining milestones and subsequent settlement of the preferred stock tranche liability in March 2020, resulting in the issuance of Series A Preferred Stock.

Change in fair value of antidilution rights liability

The change in fair value for the antidilution rights liability was primarily due to an increase in the probability of termination of the Broad License Agreement. In February 2021, we provided written notice to Broad of our intent to terminate the Broad License Agreement, which termination will be effective in June 2021.

Change in fair value of success payments liability

The change in fair value for the success payments liability was primarily due to an increase in the probability of termination of the Broad License Agreement. In February 2021, we provided written notice to Broad of our intent to terminate the Broad License Agreement, which termination will be effective in June 2021.

Interest and other income (expense), net

The decrease of $0.1 million in the three months ended March 31, 2021 compared to the three months ended March 31, 2020 was attributable to lower interest rates on our investments for the three months ended March 31, 2021.

Comparison of years ended December 31, 2020 and 2019

The following table summarizes our results of operations for the years ended December 31, 2020 and 2019:

	Year ended December 31,		
	2020	2019	Change
	(in thousands)		
Operating expenses:			
Research and development	$ 35,371	$ 11,144	$ 24,227
General and administrative	5,256	2,498	2,758
Total operating expenses	40,627	13,642	26,985
Other income (expense):			
Change in fair value of preferred stock tranche liability	2,507	(4,883)	7,390
Change in fair value of antidilution rights liability	(5,359)	(982)	(4,377)
Change in fair value of success payment liability	(2,387)	(68)	(2,319)
Interest income and other income (expense), net	162	278	(116)
Total other income (expense)	(5,077)	(5,655)	578
Net loss	$(45,704)	$(19,297)	$(26,407)

Research and development expenses

The following table summarizes our research and development expenses for the years ended December 31, 2020 and 2019:

	Year ended December 31,	
	2020	2019
	(in thousands)	
Employee-related expenses	$ 7,294	$ 2,602
Raw material costs and external expenses associated with manufacturing activities, including third-party CMOs	5,684	12
External expenses associated with preclinical studies performed by outside consulting services, including third-party CROs	11,907	1,417
Lab supplies used in research and development activities	2,094	1,190
Facility-related costs (including depreciation)	2,542	307
License and milestone payments	3,938	4,613
Other research and development costs	1,912	1,003
Total research and development expenses	$35,371	$11,144

Research and development expenses were $35.4 million for the year ended December 31, 2020, compared to $11.1 million for the year ended December 31, 2019. The increase of $24.2 million was primarily due to the following:

- an increase in external expenses associated with preclinical studies (primarily animal-study costs) performed by outside consulting services, including third-party CROs, of $10.5 million;
- an increase in external expenses associated with developing and validating our manufacturing process for use in our preclinical studies and future clinical trials of $5.7 million, including the cost of raw materials used in our research and development activities of $3.9 million;

- an increase in personnel-related costs of $4.7 million driven by an increase in headcount of employees involved in research and development activities;
- an increase in lab supplies of $0.9 million due to the increased investment in research and development activities in 2020;
- an increase in facility-related costs (including depreciation) and other allocated miscellaneous expenses of $2.2 million due to the increased investment in research and development activities in 2020;
- an increase in other research and development costs of $0.9 million, primarily due to an increase in professional fees and consulting fees in support of increased investment in research and development activities in 2020; and
- a decrease in research and development expense attributed to license and milestone payments of $0.7 million, primarily due to fewer licensing transactions in 2020 (and therefore reduced upfront licensing payments).

General and administrative expenses

General and administrative expenses were $5.3 million for the year ended December 31, 2020, compared to $2.5 million for the year ended December 31, 2019. The increase of $2.8 million was primarily attributable to the following:

- an increase of $2.0 million in personnel, facility and other expenses stemming from an increase in headcount to support our growth; and
- an increase of $0.4 million in legal and professional service fees, primarily due to increased professional fees for audit, tax and consulting services.

Other income (expense)

Change in fair value of preferred stock tranche liability

The change in fair value of the preferred stock tranche liability was primarily due to an increase in 2019 of the probability of the tranche milestones being met, followed by the settlement of the preferred stock tranche liability in March 2020 and issuance of Series A Preferred Stock.

Change in fair value of antidilution rights liability

The change in fair value of the antidilution rights liability was primarily attributable to a higher cumulative probability in 2020 of the respective triggering events being met.

Change in fair value of success payments liability

The change in fair value of the success payments liability was primarily attributable to a higher cumulative probability in 2020 of the respective triggering events being met.

Interest and other income (expense), net

The decrease of $0.1 million in 2020 was attributable to lower interest rates on our investments in 2020 compared to 2019.

Liquidity and capital resources

Sources of liquidity and capital

Since our inception in 2018, we have incurred significant operating losses. Our net losses for the years ended December 31, 2020 and 2019 were $45.7 million and $19.3 million, respectively, and $13.3 million for the three months ended March 31, 2021. As of March 31, 2021, we have an accumulated deficit of $79.8 million. We expect to incur significant expenses and operating losses for the foreseeable future as we advance the preclinical and, if successful, clinical development of our programs. To date, we have funded our operations primarily with proceeds from the sales of Preferred Stock. Through March 31, 2021, we raised an aggregate of $216.5 million in gross proceeds from sales of our Preferred Stock. As of March 31, 2021, we had $99.4 million in cash and cash equivalents and $50.1 million in marketable securities.

Cash flows

The following table summarizes our sources and uses of cash for each period presented:

	Year ended December 31,		Three months ended March 31,	
	2020	2019	2021	2020
	(in thousands)			
Cash used in operating activities	$ (35,265)	$ (7,442)	$ (15,141)	$ (6,822)
Cash provided by (used in) investing activities	(51,127)	(12,758)	11,714	8,639
Cash provided by financing activities	92,627	17,954	93,831	29,731
Net increase (decrease) in cash, cash equivalents and restricted cash	$ 6,235	$ (2,246)	$ 90,404	$ 31,548

Operating activities

For the three months ended March 31, 2021, net cash used in operating activities was $15.1 million, consisting primarily of our net loss of $13.3 million, a decrease in our operating assets and liabilities of $2.2 million and non-cash items of $0.8 million associated with the fair value change in the antidilution rights and success payments liabilities. These amounts were partially offset by the following non-cash changes: stock-based compensation of $0.7 million, depreciation expense of $0.3 million and amortization of investment premiums of $0.2 million.

For the three months ended March 31, 2020, net cash used in operating activities was $6.8 million, consisting primarily of our net loss of $5.6 million and non-cash items of $2.6 million, primarily associated with the fair value change in the preferred stock tranche and success payment liabilities. These amounts were partially offset by the following non-cash changes: change in fair value of antidilution rights liability of $0.9 million, depreciation expense of $0.2 million, stock-based compensation of $0.1 million and a net increase in our operating assets and liabilities of $0.2 million.

For the year ended December 31, 2020, net cash used in operating activities was $35.3 million, consisting primarily of our net loss of $45.7 million and a decrease attributable to non-cash items of $2.5 million associated with the fair value change in the preferred stock tranche liability. These amounts were partially offset by the following non-cash changes: change in fair value of antidilution rights and success payment liabilities of $7.7 million, depreciation expense of $1.3 million, stock-based compensation of $0.9 million and amortization of premiums on marketable securities of $0.4 million, as well as a net increase in our operating assets and liabilities of $2.6 million.

For the year ended December 31, 2019, net cash used in operating activities was $7.4 million, consisting primarily of our net loss of $19.3 million, which was partially offset by the following non-cash charges: change in fair value of preferred stock tranche liability of $4.9 million, non-cash research and development license expense of $2.8 million (primarily associated with our Harvard/Broad License Agreement and Broad License Agreement), change in fair value of antidilution rights and success payment liabilities of $1.1 million, stock-based compensation of $0.4 million and a net increase in our operating assets and liabilities of $2.7 million.

Investing activities

For the three months ended March 31, 2021, net cash provided by investing activities was $11.7 million and consisted of maturities of marketable securities of $24.0 million, offset partially by purchases of property and equipment of $1.1 million, primarily related to lab equipment, and purchases of marketable securities of $11.2 million.

For the three months ended March 31, 2020, net cash provided by investing activities was $8.6 million and consisted of maturities of marketable securities of $9.7 million, offset partially by purchases of property and equipment of $1.1 million.

For the year ended December 31, 2020, net cash used in investing activities was $51.1 million and consisted of purchases of property and equipment of $3.4 million, primarily related to lab equipment, and purchases of marketable securities of $98.5 million, which amounts were offset partially by maturities of marketable securities of $50.8 million.

For the year ended December 31, 2019, net cash used in investing activities was $12.8 million and consisted of purchases of property and equipment of $1.9 million, primarily related to lab equipment, and purchases of marketable securities of $22.0 million, which amounts were offset partially by maturities of marketable securities of $11.1 million.

Financing activities

For the three months ended March 31, 2021, net cash provided by financing activities was $93.8 million, consisting primarily of the net proceeds from the issuance of Series B Preferred Stock.

For the three months ended March 31, 2020, net cash provided by financing activities was $29.7 million, consisting primarily of the net proceeds from the issuance of Series A Preferred Stock.

For the year ended December 31, 2020, net cash provided by financing activities was $92.6 million, consisting of the net proceeds from the issuance of Series A Preferred Stock of $29.7 million and net proceeds from the issuance of Series A-2 Preferred Stock of $62.9 million.

For the year ended December 31, 2019, net cash provided by financing activities was $18.0 million consisting primarily of net proceeds from the issuance of Series A Preferred Stock.

Funding requirements

Our operating expenses and future funding requirements are expected to increase substantially as we continue to advance our portfolio of programs.

Specifically, our expenses will increase if and as we:

- continue our current research programs and our preclinical development of product candidates from our current research programs;
- seek to identify additional research programs and additional product candidates;

- advance our existing and future product candidates into clinical development;
- initiate preclinical studies and clinical trials for any additional product candidates we identify and develop or expand development of existing programs into additional patient populations;
- maintain, expand, enforce, defend and protect our intellectual property portfolio and provide reimbursement of third-party expenses related to our patent portfolio;
- seek regulatory and marketing approvals for any of our product candidates that we develop;
- seek to identify, establish and maintain additional collaborations and license agreements, and the success of those collaborations and license agreements;
- make milestone payments to Beam under our collaboration and license agreement with Beam, to Acuitas under our non-exclusive license agreement with Acuitas, under the Harvard/ Broad License Agreements, and under any additional future collaboration or license agreements that we obtain;
- ultimately establish a sales, marketing, and distribution infrastructure to commercialize any drug products for which we may obtain marketing approval, either by ourselves or in collaboration with others;
- generate revenue from commercial sales of product candidates we may develop for which we receive marketing approval;
- further develop our base editing technology;
- hire additional personnel including research and development, clinical and commercial personnel;
- add operational, financial and management information systems and personnel, including personnel to support our product development;
- acquire or in-license products, intellectual property, medicines and technologies;
- satisfy any post-marketing requirements, such as a cardiovascular outcomes trial;
- establish commercial-scale current good manufacturing practices, or cGMP, capabilities through a third-party or our own manufacturing facility; and
- operate as a public company.

As of March 31, 2021, we had cash, cash equivalents and marketable securities of $149.5 million. We believe that the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, will enable us to fund our operating expenses and capital expenditure requirements into 2024. We have based this estimate on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect.

Identifying potential product candidates and conducting preclinical testing and clinical trials is a time consuming, expensive and uncertain process that takes years to complete, and we may never generate the necessary data or results required to obtain marketing approval and achieve product sales. In addition, our product candidates, if approved, may not achieve commercial success. Our commercial revenues, if any, will be derived from sales of products that we do not expect to be commercially available for several years, if ever. Accordingly, we will need to obtain substantial additional funds to achieve our business objectives.

Our expectation with respect to our ability to fund current planned operations is based on estimates that are subject to risks and uncertainties. Our operating plan may change as a result of many factors currently unknown to management and there can be no assurance that the current operating plan will be achieved in the time frame anticipated by us, and we may need to seek additional funds sooner than planned.

Adequate additional funds may not be available to us on acceptable terms, or at all. We do not have any source of committed external funds. Market volatility resulting from the COVID-19 pandemic or other factors could also adversely impact our ability to access capital as and when needed. To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, selling or licensing our assets, making capital expenditures or declaring dividends and may require the issuance of warrants, which could potentially dilute your ownership interest.

If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings or other arrangements when needed or on terms acceptable to us, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

For additional information on risks associated with our substantial capital requirements, please see “Risk factors—Even if we consummate this offering, we will need substantial additional funding. If we are unable to raise capital when needed, we could be forced to delay, reduce or eliminate our product development programs or commercialization efforts.”

Contractual obligations

The following table is a summary of our significant contractual obligations as of December 31, 2020:

		Payments due by period			
Contractual obligation	**Total**	**Less than 1 year**	**More than 1 year and less than 3**	**More than 3 years and less than 5**	**More than 5 years**
			(in thousands)		
Operating lease obligation(1)	$2,663	$ 1,671	$ 992	$ —	$ —

(1) Represents future minimum lease payments under our operating lease for office and lab space in Cambridge, Massachusetts that expires in August 2022.

We enter into contracts in the normal course of business with CROs, CMOs and other third parties for preclinical research studies and manufacturing services. These contracts do not contain minimum purchase commitments and are cancelable by us upon prior written notice. Payments due upon cancellation consist only of payments for services provided or expenses incurred, including noncancelable obligations of our service providers, up to the date of cancellation. These payments are not included in the table of contractual obligations above as the amount and timing of such payments are not known.

We have also entered into license agreements under which we may be obligated to make certain payments. The table above does not include potential success payments, sublicense fees, royalty fees, licensing maintenance fees and reimbursement of patent maintenance costs that we may be required to pay under license agreements. Our agreements to license intellectual property include potential milestone payments that are dependent upon the development of products using the intellectual property licensed under the agreements and contingent upon the achievement of development or regulatory approval milestones, as well as commercial and success payment milestones. We have not included such potential obligations in the table above because they are contingent upon the occurrence of future events and the timing and likelihood of such potential obligations are not known. For additional information about our license agreements and amounts that could

become payable in the future under such agreements, see “Business—License and collaboration agreements” and Note 8, License agreements, to our consolidated financial statements appearing elsewhere in this prospectus.

Emerging growth company and smaller reporting company status

As an emerging growth company, or EGC, under the Jumpstart Our Business Startups Act of 2012, or JOBS Act, we may delay the adoption of certain accounting standards until such time as those standards apply to private companies. Other exemptions and reduced reporting requirements under the JOBS Act for EGCs include presentation of only two years of audited financial statements in a registration statement for an initial public offering, or IPO, an exemption from the requirement to provide an auditor’s report on internal controls over financial reporting pursuant to Section 404(b) of the Sarbanes-Oxley Act of 2002, an exemption from any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation, and less extensive disclosure about our executive compensation arrangements.

In addition, the JOBS Act provides that an EGC can take advantage of an extended transition period for complying with new or revised accounting standards. This provision allows an EGC to delay the adoption of some accounting standards until those standards would otherwise apply to private companies. We have elected to use this extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies until the earlier of the date we (i) are no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, our consolidated financial statements may not be comparable to companies that comply with new or revised accounting pronouncements as of public company effective dates.

We may remain classified as an EGC until the end of the fiscal year in which the fifth anniversary of this offering occurs, although if the market value of our common stock that is held by non-affiliates exceeds $700 million as of any June 30 before that time or if we have annual gross revenues of $1.07 billion or more in any fiscal year, we would cease to be an emerging growth company as of December 31 of the applicable year. We also would cease to be an EGC if we issue more than $1 billion of non-convertible debt over a three-year period.

We are also a “smaller reporting company,” meaning that the market value of our shares held by non-affiliates plus the proposed aggregate amount of gross proceeds to us as a result of this offering is less than $700 million and our annual revenue was less than $100 million during the most recently completed fiscal year. We may continue to be a smaller reporting company after this offering if either (i) the market value of our shares held by non-affiliates is less than $250 million or (ii) our annual revenue was less than $100 million during the most recently completed fiscal year and the market value of our shares held by non-affiliates is less than $700 million. If we are a smaller reporting company at the time we cease to be an emerging growth company, we may continue to rely on exemptions from certain disclosure requirements that are available to smaller reporting companies.

Critical accounting policies and significant judgments

This management’s discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which we have prepared in accordance with U.S. generally accepted accounting principles. The preparation of these financial statements and related disclosures requires us to make estimates, judgments and assumptions that affect the reported amounts of assets, liabilities, and expenses and the disclosure of contingent assets and liabilities in our consolidated financial statements. We base our estimates on historical experience, known trends and events and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the

carrying values of assets and liabilities that are not readily apparent from other sources. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in more detail in Note 2 to our consolidated financial statements appearing elsewhere in this prospectus, we believe that the following accounting policies are those most critical to the judgments and estimates used in the preparation of our consolidated financial statements:

- accrued research and development expenses;
- stock-based compensation and common stock valuation; and
- fair value measurements.

Accrued research and development expenses

As part of the process of preparing our consolidated financial statements, we are required to estimate certain accrued research and development expenses. This process involves estimating the level of service performed and the associated cost incurred for the service when we have not yet been invoiced or otherwise notified of actual costs. We make estimates of our accrued expenses as of each balance sheet date in our consolidated financial statements based on facts and circumstances known to us at that time. We periodically confirm the accuracy of the estimates with the service providers and make adjustments if necessary. Examples of estimated accrued research and development expenses include those related to fees paid to:

- vendors in connection with discovery and preclinical development activities;
- CROs in connection with preclinical studies and testing; and
- CMOs in connection with the process development and scale up activities and the production of materials.

We base the expense recorded related to contract research and manufacturing on our estimates of the services received and efforts expended pursuant to quotes and contracts with multiple CROs and CMOs that conduct services and supply materials. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows. In accruing service fees, we estimate the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from the estimate, we adjust the accrual accordingly. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may result in reporting amounts that are too high or too low in any particular period. To date, there have not been any material adjustments to our prior estimates of accrued research and development expenses. While the majority of our service providers invoice us in arrears for services performed, on a pre-determined schedule or when contractual milestones are met; some require advance payments. There may be instances in which payments made to our vendors will exceed the level of services provided and result in a prepayment of the expense. We record these as prepaid expenses on our consolidated balance sheet.

Stock-based compensation

We measure stock options and other stock-based awards granted to employees, directors, consultants or founders based upon their fair value on the date of the grant and recognize stock-based compensation expense over the requisite service period, which is generally the vesting period of the respective award. We recognize forfeitures as they occur.

The stock-based compensation awards are subject to either service or performance-based vesting conditions. We apply the straight-line method of expense recognition to all awards with service-based vesting and recognize stock-based compensation for performance awards based on grant date fair value over the service period using the accelerated attribution method to the extent achievement of the performance condition is probable.

We estimate the fair value of each stock option grant on the date of grant using the Black-Scholes option-pricing model, which uses inputs such as the fair value of our common stock, assumptions we make for the volatility of our common stock, the expected term of our stock options, the risk-fee interest rate for a period that approximates the expected term of our stock options and our expected dividend yield. The fair value of our common stock is used to determine the fair value of restricted stock awards.

The Black-Scholes option pricing model requires inputs based on certain subjective assumptions, including (i) the expected stock price volatility, (ii) the expected term of the award, (iii) the risk-free interest rate and (iv) expected dividends. Due to the lack of a public market for our common stock and lack of company-specific historical and implied volatility data, we have based our computation of expected volatility on the historical volatility of a representative group of public companies with similar characteristics to us, including stage of product development and life science industry focus. The historical volatility is calculated based on a period of time commensurate with expected term assumption. We use the simplified method as prescribed by the SEC Staff Accounting Bulletin No. 107, *Share-Based Payment*, to calculate the expected term for options granted to employees and non-employees whereby the expected term equals the arithmetic average of the vesting term and the original contractual term of the options due to lack of sufficient historical data. The risk-free interest rate is based on U.S. Treasury securities with a maturity date commensurate with the expected term of the associated award. The expected dividend yield is assumed to be zero as we have never paid dividends and have no current plans to pay any dividends on our common stock.

Determination of the fair value of our common stock

As there has been no public market for our common stock, the estimated fair value of our common stock has been approved by our board of directors, with input from management, as of the date of each award grant, considering our most recently available independent third-party valuation of common stock and our board of directors' assessment of additional objective and subjective factors deemed relevant that may have changed from the date of the most recent valuation through the date of the grant.

We obtained third-party independent valuations of our common stock as of June 2020, January 2021 and March 2021, which valuations were considered by our board of directors in determining the fair value of our common stock. These valuations were performed in accordance with the framework of the American Institute of Certified Public Accountants' Accounting and Valuation Guide, *Valuation of Privately-Held Company Equity Securities Issued as Compensation*. Where possible, the estimates of the fair value of common stock were based on the Backsolve Method, which is a form of a Market Approach, and, specifically, the Subject Company Transaction Method. In the Backsolve Method, the value of the total equity was derived based on the price paid for the most recent transaction of preferred stock with outside investors in arms' length transactions, adjusted for the presence of any tranche rights. In the valuations, our common stock value was estimated using either the Option Pricing Method, or OPM, or the Hybrid Method, which comprises the elements of both the Probability-Weighted Expected Return Method and the OPM. The OPM treats common securities and preferred securities as call options on the total equity value of a company, with exercise prices based on the value thresholds at which the allocation among the various holders of a company's securities changes. Under this method, the common stock has value only if the funds available for distribution exceed the value of the preferred security liquidation preference at the time of the liquidity event, such as a strategic sale or a merger. The Hybrid Method estimates the probability-weighted value across multiple scenarios but uses the OPM to estimate the allocation of value within at least one of the scenarios. The Hybrid Method used to estimate the fair value of our common stock considered a sale and an IPO scenario, in which the shares of convertible preferred stock

are assumed to mandatorily convert into common stock. In the IPO scenario, the preferred stock was treated on an as-if-converted basis, while the optionality of any outstanding options was modeled using the OPM framework to properly account for the strike prices of the options. The value indications from the sale and IPO scenarios were probability weighted and discounted by the discount for lack of marketability commensurate with the time to exit in order to arrive at an indication of value for the common stock.

The values of our common stock determined by these independent third-party valuations were $3.43 per share in June 2020, $8.24 per share in January 2021 and $8.98 per share in March 2021.

The additional objective and subjective factors considered by our board of directors in determining the fair value of our common stock included the following, and, if the grant date as of which fair value was being determined was a date later than the date of the most recent independent third-party valuation of our common stock, our board of directors considered changes in such factors from the date of the most recent such valuation through the grant date:

- the prices of our preferred stock sold to outside investors in arm's length transactions, if any, and the rights, preferences and privileges of our preferred stock as compared to those of our common stock, including the liquidation preferences of our preferred stock;
- the progress of our research and development efforts, including the status of preclinical studies for our product candidate;
- the lack of liquidity of our equity as a private company;
- our stage of development and business strategy and the material risks related to our business and industry;
- the valuation of publicly traded companies in the life sciences, biotechnology and gene editing sectors, as well as recently completed mergers and acquisitions of peer companies;
- any external market conditions affecting the biotechnology industry, and trends within the biotechnology industry; the likelihood of achieving a liquidity event, such as an IPO or a sale of our company in light of prevailing market conditions; and the analysis of IPOs and the market performance of similar companies in the biopharmaceutical industry.

The assumptions underlying the valuations represent management's best estimates, which involve inherent uncertainties and the application of management judgement. As a result, if factors or expected outcomes change and we use significantly different assumptions or estimates, the fair value of our stock-based compensation could be materially different.

Following the closing of this offering, the fair value of our common stock will be determined based on the closing price as reported on the date of grant on the primary stock exchange on which our common stock is traded.

Awards granted

The following table summarizes the types of awards granted from January 1, 2020 through the date of this prospectus and includes for each grant date the per share exercise price of options, the per share fair value of the common stock on the grant date, the number of shares underlying each grant and the per share estimated value of awards on the grant date.

Grant date	Type of award	Per share exercise price of options	Per share fair value of common stock on grant date	Number of shares underlying grant	Per share estimated value of award on grant date
September 16, 2020	Stock Options	$ 2.87	$ 3.43(1)	1,853,841	$ 2.50
December 9, 2020	Stock Options	$ 2.87	$ 8.24(1)	111,777	$ 6.94
February 12, 2021	Stock Options	$ 8.24	$ 8.24	1,152,060	$ 5.93
February 19, 2021	Stock Options	$ 8.24	$ 8.24	226,794	$ 5.93
April 1, 2021	Stock Options	$ 8.98	$ 8.98	380,690	$ 6.39
				3,725,162	

(1) We performed a retrospective fair value assessment and concluded that the fair value of our common stock underlying stock options that we granted for the dates noted in this table should be adjusted for accounting purposes. This reassessed value was based, in part, upon third-party valuations of our common stock prepared on a retrospective basis and used for certain grant dates as indicated in the table above. These third-party valuations were prepared using a hybrid approach, which considered an IPO scenario and sale scenarios to determine our enterprise value as further described above.

Fair value measurements

Preferred stock tranche liability

We have determined that our obligation to issue, and our investors' obligation to purchase, additional shares of Series A Preferred Stock pursuant to the second and third closings of our Series A financing represent a freestanding instrument that is classified as a liability under Accounting Standards Codification, or ASC 480, *Distinguishing Liabilities From Equity*. The resulting preferred stock tranche liability was initially recorded at fair value, with gains and losses arising from changes in fair value recognized in other income (expense) in the statement of operations. The preferred stock tranche liability was remeasured at each reporting period and upon the exercise or expiration of the obligation. The preferred stock tranche liability was valued using a probability-weighted present value model that considered the probability of triggering the tranche rights through achievement of certain non-scientific and scientific milestones. The preferred stock tranche liability was settled in full during 2020 with the issuance of additional shares of Series A Preferred Stock.

Antidilution rights liability

The antidilution rights liability represents the obligation to issue additional shares of common stock to Harvard and Broad following the completion of preferred stock financings and upon the closing of this offering. These antidilution rights are accounted for under ASC 815, *Derivatives and Hedging*, and were initially recorded at fair value with a corresponding charge to research and development expense. Any subsequent changes in fair value are recognized in other income (expense) in the statement of operations at each reporting period. The antidilution rights liability was valued using (i) a probability-weighted present value model that considered the probability of meeting the defined aggregate level of preferred stock financing, as well as the fair value of our common stock and (ii) a Monte Carlo simulation model, which models the value of the liability based on several key variables, including probability of event occurrence, timing of event occurrence, as well as the fair value of our common stock.

The antidilution rights liability was partially satisfied in 2019 and 2020 and it will be satisfied in full upon the issuance of an aggregate of an additional 878,098 shares of common stock upon the closing of this offering,

based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under “Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College.”

Success payments liability

We are required to make success payments to Harvard and Broad in the event our average market capitalization, following the filing of our first Quarterly Report on Form 10-Q, exceeds specified thresholds ascending from a high nine digit dollar amount to $10.0 billion, or sale of our company for consideration in excess of those thresholds. In the event of a change of control of our company or a sale of our company, we are required to pay in cash within a specified period following such event. Otherwise, the payments may be settled at our option in either cash or shares of our common stock, or a combination of cash and shares of our common stock. The success payments are accounted for under ASC 815, *Derivatives and Hedging*, and were initially recorded at fair value with a corresponding charge to research and development expense. Any subsequent changes in fair value are recognized in other income (expense) in the statement of operations. We will continue to adjust the liability for changes in fair value until the earlier of the achievement or expiration of the success payment obligation. To determine the estimated fair value of the success payments, we used a Monte Carlo simulation model, which models the value of the liability based on several key variables, including probability of event occurrence, timing of event occurrence, as well as the value of our common stock.

Off-balance sheet arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, as defined in the rules and regulations of the Securities and Exchange Commission.

Recently issued accounting pronouncements

See Note 2, “Summary of significant accounting policies – Recently issued accounting pronouncements” to our consolidated financial statements included elsewhere in this prospectus for more information.

Quantitative and qualitative disclosures about market risk

We are exposed to market risk related to changes in interest rates. As of December 31, 2020, we had cash and equivalents of $9.0 million, which consisted of standard checking accounts and money market account funds that invest primarily in the U.S. government-backed securities and treasuries. In addition, as of December 31, 2020, we also had marketable securities of $63.1 million, which consist of U.S. treasury securities and agency securities. Interest income is sensitive to change in the general level of interest rates, however, due to the short-term maturities of our cash equivalents and the low risk profile of our marketable securities, an immediate 10% change in interest rates would not have a material effect on the fair market value of our cash equivalents and marketable securities.

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates; however, we do contract with vendors that are located outside of the United States and may be subject to fluctuations in foreign currency rates. We may enter into additional contracts with vendors located outside of the United States in the future, which may increase our foreign currency exchange risk.

We do not believe that inflation had a material effect on our business, financial condition or results of operations during the year ended December 31, 2020.

Business

Overview

We are a genetic medicines company pioneering a new approach to the care of cardiovascular disease, or CVD, transforming treatment from chronic management to single-course gene editing medicines. Despite advances in treatment over the last 50 years, CVD remains the leading cause of death worldwide. The current paradigm of chronic care is fragile—requiring rigorous patient adherence, extensive healthcare infrastructure and regular healthcare access—and leaves many patients without adequate care. Our goal is to disrupt the chronic care model for CVD by providing a new therapeutic approach with single-course *in vivo* gene editing treatments focused on addressing the root causes of this highly prevalent and life-threatening disease. Our initial two programs target PCSK9 and ANGPTL3, respectively, genes that have been extensively validated as targets for lowering blood lipids, such as low-density lipoprotein cholesterol, or LDL-C. We believe that editing these genes could potently and durably lower LDL-C throughout the lifetime of patients with or at risk for atherosclerotic cardiovascular disease, or ASCVD, the most common form of CVD.

Our approach leverages multiple breakthroughs in 21st century biomedicine—human genetic analysis, gene editing, messenger RNA, or mRNA, -based therapies and lipid nanoparticle, or LNP, delivery—to target genes that are predominantly expressed in the liver and disrupt the production of proteins that cause CVD. We are advancing a pipeline of single-course *in vivo* gene editing programs, each designed to mimic natural disease resistance mutations and turn off specific genes in order to lower blood lipids, thereby reducing the risk of ASCVD. We intend to initially develop these programs for the treatment of patients with familial hypercholesterolemia, or FH, a genetic disease that causes life-long severely elevated blood LDL-C, leading to increased risk of early-onset ASCVD. If our programs are successful in FH, we believe they could also provide a potential treatment for the broader population of patients with established ASCVD. Ultimately, we believe that these treatments could potentially be developed for administration to people at risk for ASCVD as a preventative measure similar to the way that certain vaccines offer long-term protection against infectious diseases.

High cumulative life-long exposure to LDL-C drives the development of atherosclerotic plaque that results in the hardening of arteries seen in ASCVD. The relationship between lowering of cumulative LDL-C exposure and reduction in the risk of ASCVD is among the best understood relationships in medicine. Studies have shown that lowering LDL-C by 39 mg/dL for five years in patients with established ASCVD reduces the risk of a further event by 21%, whereas a similar degree of LDL-C difference over a lifetime reduces the risk of a first ASCVD event by 88%. This demonstrates that the challenge is not only to substantially reduce LDL-C but also to sustain such a reduction throughout a patient's lifetime. We believe that the cornerstone of the treatment and prevention of ASCVD must be early and aggressive reduction of LDL-C for as long as possible.

The current standard of care is a chronic care model that often fails to sufficiently control overall LDL-C exposure due to the continuous and life-long nature of its treatment approaches and the inherent adherence issues it presents. As a result, a large proportion of patients with established ASCVD have LDL-C levels above the goal recommended by the American Heart Association, or the AHA, and the American College of Cardiology, or the ACC, leaving them at risk for recurrent ASCVD events and the potential for invasive medical procedures or even death. Furthermore, given the silent nature of the damage done by elevated LDL-C, many patients at risk for ASCVD do not properly appreciate the therapeutic benefits of consistent treatment as well as the substantial risk of foregoing treatment, focusing instead on the heavy, life-long medication burden of daily pills, lifestyle changes and other chronic approaches. We believe that single-course gene editing treatments that potently and durably control cumulative LDL-C exposure could fundamentally disrupt the chronic care model for treating patients with or at risk for ASCVD and relieve the significant burden placed on patients, providers and the healthcare system.

Our lead product candidate, VERVE-101, is designed to permanently turn off the PCSK9 gene in the liver. PCSK9 is a highly validated target that plays a critical role in controlling blood LDL-C through its regulation of the LDL receptor, or LDLR. Reduction of PCSK9 protein in the blood improves the ability of the liver to clear LDL-C from the blood. VERVE-101 utilizes LNP-mediated delivery to target the liver and base editing technology to make a single base change at a specific site in the PCSK9 gene in order to disrupt PCSK9 protein production.

In an ongoing *in vivo* proof-of-concept study in non-human primates, or NHPs, we observed substantial lowering of LDL-C levels that was sustained over an extended period of time following treatment. In this study, following a single intravenous infusion of a base editor targeting PCSK9, we observed an average reduction of blood PCSK9 protein of 89% accompanied by an average reduction of blood LDL-C levels of 59% at two weeks after treatment. This LDL-C reduction was maintained at an average of 62% for ten months following treatment. If we are able to achieve similar reductions in PCSK9 protein levels in humans, we believe this could result in marked and sustained LDL-C reductions of approximately 60%, which would potentially offer superior cumulative LDL-C lowering to what has been clinically demonstrated with other PCSK9-targeting treatment modalities. In addition, in our preclinical studies in NHPs, VERVE-101 has been well tolerated following a single administration with only mild elevations in liver function tests that resolved within two weeks. In primary human hepatocytes treated with VERVE-101, we observed on-target editing at the PCSK9 target site and did not observe editing at any of 141 identified potential off-target sites.

Based on our preclinical data, we are advancing VERVE-101 initially for the treatment of heterozygous familial hypercholesterolemia, or HeFH, which is estimated to affect approximately 31 million patients globally. We plan to expand clinical development of VERVE-101 in a stepwise fashion beyond HeFH for the treatment of patients with established ASCVD, which represents hundreds of millions of potential patients globally. Ultimately, we believe that VERVE-101 may be useful to people at risk for ASCVD as a preventative measure in the general population. We have initiated investigational new drug application, or IND, -enabling studies for VERVE-101. We intend to submit an IND to the United States Food and Drug Administration, or FDA, and comparable foreign regulatory authorities in 2022, followed by initiation of clinical development for patients with HeFH.

Our second program is designed to permanently turn off the ANGPTL3 gene in the liver. ANGPTL3 is a key regulator of cholesterol and triglyceride metabolism. We believe that disrupting ANGPTL3 protein production may lead to reductions in LDL-C and triglyceride levels through a mechanism distinct from that of PCSK9. We plan to develop this program initially for the treatment of FH, including both homozygous familial hypercholesterolemia, or HoFH, which is an orphan indication that affects approximately 1,300 patients in the United States, as well as the more prevalent HeFH indication. Similar to our approach with VERVE-101, we plan to expand the clinical development of our ANGPTL3 program in a stepwise fashion beyond FH to patients with established ASCVD. Ultimately, we believe that our ANGPTL3 program may also be useful to people at risk for ASCVD as a preventative measure in the general population.

In preclinical studies of our ANGPTL3 program in NHPs, we observed an average reduction of blood ANGPTL3 protein levels of 96% during the ten-month period following a single treatment. We anticipate nominating a lead development candidate for our ANGPTL3 program and initiating IND-enabling studies in 2022.

We are striving to build the preeminent company developing gene editing medicines to treat patients with CVD, leveraging the expertise and capabilities of our team whose singular focus is on addressing the root causes of the world’s leading cause of mortality. We envision expanding beyond our PCSK9 and ANGPTL3 programs to develop a suite of single-course gene editing medicines that comprehensively and robustly address additional independent causes of CVD. Ultimately, we intend to apply our single-course gene editing approach to additional CVD indications with high unmet needs that are driven by mutations in genes expressed in the liver, including certain forms of cardiomyopathy.

Our team

We were founded in 2018 by a team of world-renowned researchers in cardiovascular genetics, pioneers of gene editing and proven business leaders, including Sekar Kathiresan, M.D., Kiran Musunuru, M.D., Ph.D., MPH, J. Keith Joung, M.D., Ph.D., Burt Adelman, M.D., Issi Rozen, MBA, and Barry Ticho, M.D., Ph.D. Since our founding, we have built an organization and culture driven by a talented team of individuals who embody the meaning behind our name—vigor, spirit and enthusiasm—and who are motivated by a common goal of transforming the care of patients with or at risk for CVD.

Members of our leadership team have extensive collective experience in human genetics, gene editing, CVD care and drug development and commercialization. Our chief executive officer, Dr. Kathiresan, is a preventive cardiologist who has made groundbreaking discoveries of genetic mutations that confer resistance to CVD. Andrew Ashe, J.D., our president and chief operating officer, is an accomplished biotech executive with over 20 years of experience in operations and legal management. Andrew Bellinger, M.D., Ph.D., our chief scientific officer, is a cardiologist with proven expertise in drug delivery, drug development and translational medicine.

We have attracted a diverse team of experts in discovery, preclinical research and clinical development, as well as gene editing technologies and the manufacturing and delivery of genetic medicines. Our team is built on several core values that drive our day-to-day activities and inspire our long-term vision:

- Grit: we work tenaciously to solve problems and advance science with rigor and care.
- Spirit: we act with integrity and inclusion to earn the trust of colleagues, partners, patients and providers.
- Drive: we enthusiastically pursue our potential, and we empower those around us to do the same.
- Passion: we are motivated by our mission to reimagine the approach to the treatment of CVD for patients and their families.

We have a Scientific Advisory Board, or SAB, comprising leading experts in the fields of cardiology, human genetics, translational medicine, delivery technologies, business and finance, including Eugene Braunwald, M.D., Daniel J. Rader, M.D., Andrew Geall, Ph.D., and Penny M. Heaton, M.D. Dr. Braunwald, a cardiovascular medicine specialist at Brigham and Women's Hospital and Hersey Professor of Medicine at Harvard Medical School, serves as chair of our SAB, has been listed as the most frequently cited author in cardiology, and was the first cardiologist elected to the National Academy of Sciences.

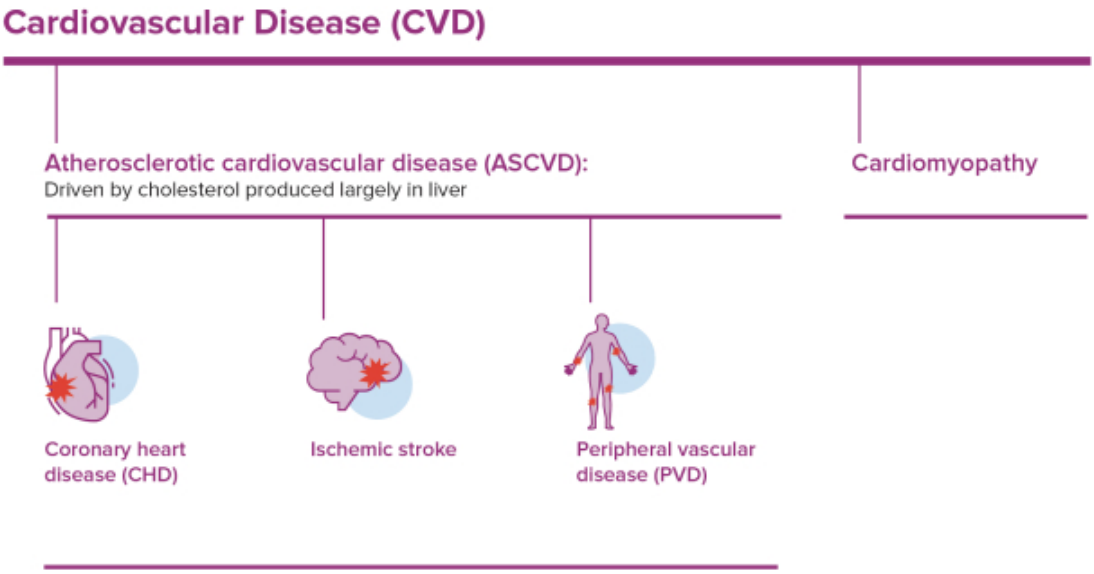
We have in-licensed technologies and intellectual property covering various elements of gene editing, including base editing and CRISPR nucleases, as well as multiple LNPs, with licenses from Beam Therapeutics Inc., or Beam, The Broad Institute, Inc., or Broad, Editas Medicine, Inc., the President and Fellows of Harvard College, or Harvard, Massachusetts General Hospital and Acuitas Therapeutics Inc., or Acuitas. In addition, since our inception through March 31, 2021, we have raised $216.5 million in capital from premier venture capital funds, healthcare-dedicated funds, major mutual funds and other leading investors that share our vision of transforming the treatment of CVD from chronic management to single-course gene editing medicines.

Transforming cardiovascular care

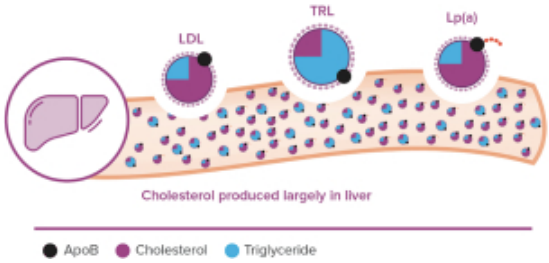
Despite advances in treatment over the last 50 years, CVD remains a global epidemic. The current paradigm of chronic care is fragile—requiring rigorous patient adherence, extensive healthcare infrastructure and regular healthcare access—and leaves many patients without adequate care. CVD remains the leading cause of death worldwide, responsible for nearly one in three deaths according to the World Health Organization. It is also a leading contributor to reductions in life expectancy and is one of the most expensive health conditions in the United States. According to the United States Centers for Disease Control and Prevention, or CDC, CVD costs the

U.S. healthcare system more than $350 billion per year in annual costs and lost productivity. Our goal is to disrupt the chronic care model for CVD by providing a new therapeutic approach focused on addressing the root causes of this highly prevalent and life-threatening disease.

CVD collectively refers to diseases of the heart and blood vessels, which are diagnosed as ASCVD or cardiomyopathy, among others, as depicted in the figure below. In ASCVD, a large subset of CVD, cholesterol drives the development of atherosclerotic plaque, a mixture of cholesterol, cells and cellular debris in the wall of a blood vessel that results in the hardening of the arteries.



High cumulative life-long exposure to blood cholesterol, which is carried in each of low-density lipoprotein, or LDL, triglyceride-rich lipoprotein, or TRL, or lipoprotein(a), or Lp(a), is a root cause of ASCVD. The graphic below depicts these liver-produced lipoproteins being secreted into the blood and their typical compositions, comprising cholesterol and triglycerides and with apolipoprotein B, or ApoB, on the surface. Each of these three lipoproteins represents an independent pathway of risk for ASCVD, and we believe that concurrently reducing the blood lipids carried in more than one of these pathways should provide additive benefit for the treatment of ASCVD.



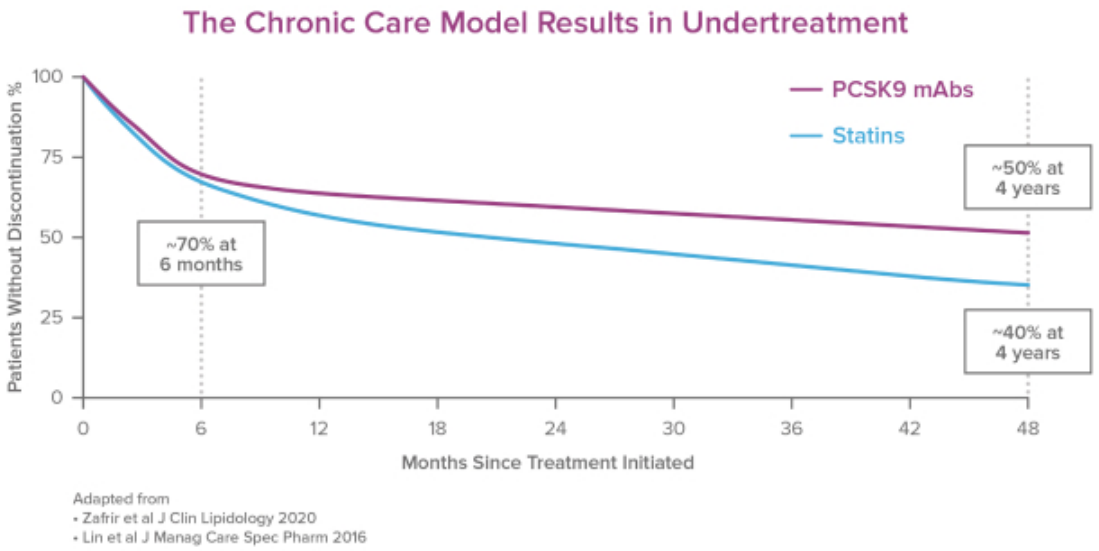
Current treatment approaches to lower LDL-C utilize continuous, life-long treatment, and due to the limitations of this chronic care model, cumulative exposure to LDL-C for many patients with ASCVD remains insufficiently controlled. The most common treatment for patients with ASCVD is daily statin pills in combination with recommended therapeutic lifestyle changes. There are several non-statin daily pills, including ezetimibe, bile acid sequestrants and bempedoic acid, that may be used alone or added sequentially to statin treatment in order to help patients with ASCVD reach recommended LDL-C goals. There are also two FDA-approved monoclonal antibodies, or mAbs, evolocumab and alirocumab, that target and bind to PCSK9 protein and are typically administered via injection twice per month. In addition, inclisiran, a small interfering RNA, or siRNA, that targets PCSK9 and is subcutaneously administered twice per year, was recently approved by the European Medicines Administration, or EMA. Despite these approved treatments, effectively controlling LDL-C levels long-term in patients with or at high risk for ASCVD remains a significant unmet need.

The relationship between lowering of cumulative LDL-C exposure and reduction in the risk of ASCVD is among the best understood relationships in medicine. Human genetic studies have shown that those with FH, a genetic disease, have life-long severely elevated blood LDL-C, which can lead to increased risk of early-onset ASCVD. Conversely, individuals born with resistance mutations that turn off a cholesterol-raising gene expressed in the liver, such as PCSK9, have life-long low levels of LDL-C and rarely suffer from ASCVD. These insights point to the importance of early aggressive treatment to reduce LDL-C exposure over a patient's lifetime. For patients with established ASCVD, such as those who have previously suffered a heart attack, clinical treatment guidelines published by the AHA/ACC recommend lowering blood LDL-C to a goal of less than 70 mg/dL, and the European Society of Cardiology, or ESC, recommends lowering blood LDL-C to a goal of less than 55 mg/dL. If blood LDL-C is maintained low enough for long enough, the risk of a first ASCVD event, including a heart attack, can be dramatically reduced. Studies have shown that lowering LDL-C by 39 mg/dL for five years in patients with established ASCVD reduces the risk of a further event by 21%, whereas a similar degree of LDL-C difference over a lifetime reduces the risk of a first ASCVD event by 88%.

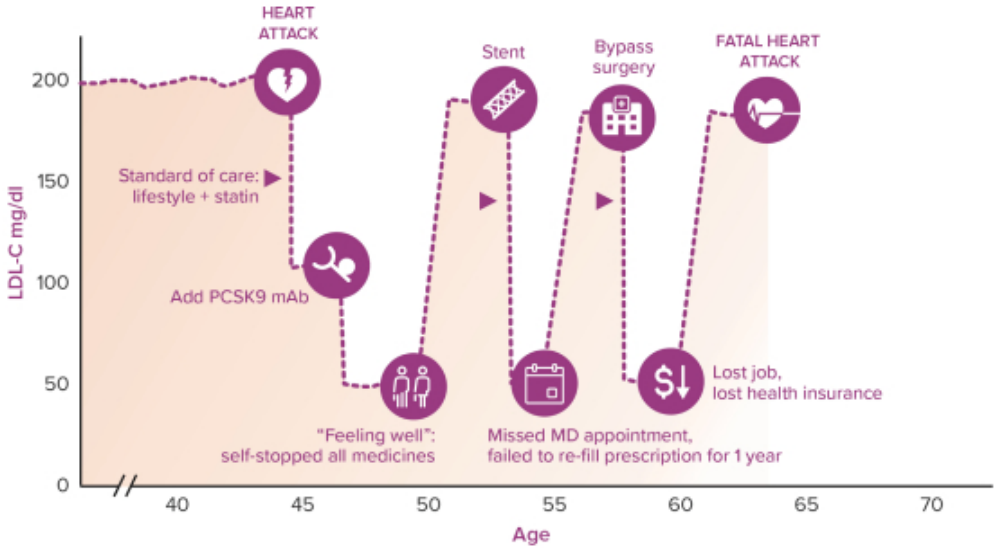
Despite the availability of statin and non-statin therapies, cumulative exposure to LDL-C is often insufficiently controlled in many patients with ASCVD. As a result, a large proportion of patients with established ASCVD have LDL-C levels above clinical treatment guidelines. In a national registry of outpatient cardiovascular care in the United States, out of 2.6 million patients who had suffered a clinical ASCVD event, 53% had not received any cholesterol-lowering therapy and 72% remained above the LDL-C levels recommended by the AHA/ACC. Further, data from a clinical trial of approximately 6,000 patients in the year following a heart attack showed that among the approximately 3,000 patients for whom the medication was provided for free, only 39% reported full adherence to their statin therapy.

A large proportion of patients with or at risk for ASCVD opt against starting or remaining on treatment due to the heavy, life-long medication burden associated with daily pills or frequent injections. Given the silent nature of the damage done by elevated LDL-C, many patients at risk for ASCVD do not properly appreciate the therapeutic benefits of consistent treatment as well as the substantial risk of foregoing treatment, focusing instead on the heavy, life-long medication burden of chronic approaches. Numerous prior studies of statins and injectable mAb PCSK9 inhibitors showed that treatment discontinuation is frequent. The graphic below

illustrates findings from two of these studies, which showed that 50% of patients or fewer remain on treatment with PCSK9 inhibitor mAbs or statins over four years.

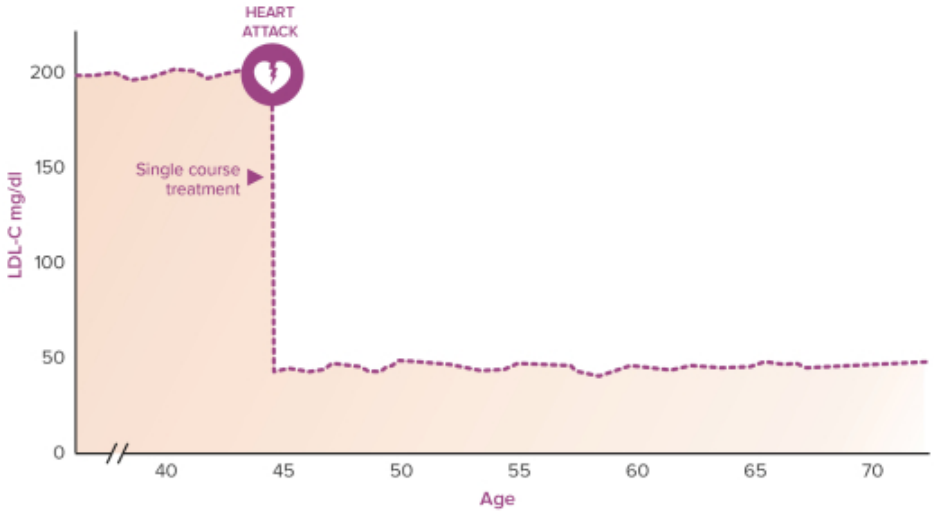


Incomplete adherence to treatment may result in significant oscillation in blood LDL-C levels over a patient's lifetime. The illustrative graphic below depicts the journey of a hypothetical patient with FH who began standard-of-care treatment after suffering a heart attack at age 44, at which point the patient was diagnosed with ASCVD, and the potential consequences of incomplete control of LDL-C over several years due to poor adherence and insufficient healthcare access. Incomplete LDL-C control can lead to recurrent clinical ASCVD events and the need for invasive medical procedures, such as intracoronary stenting and coronary artery bypass surgery, and can be fatal. These recurrent events and procedures place a heavy burden on patients, treating providers and the medical system as a whole, with increased cost and use of healthcare services.



Advantages of our single-course gene editing treatments for ASCVD

We believe that single-course gene editing treatments for patients with ASCVD have the potential to solve many of the challenges of the chronic care model and create a new paradigm for the treatment of this highly prevalent and life-threatening disease. By potently and durably controlling cumulative LDL-C exposure throughout a patient's lifetime, we believe our gene editing medicines could fundamentally disrupt the chronic care model for patients with or at risk for ASCVD and relieve the significant burden placed on patients, providers and the healthcare system. The illustrative graphic below depicts the journey of the same hypothetical patient with FH who, in this case, received a single-course gene editing treatment after suffering a heart attack and avoided recurrent ASCVD events as a result.



To achieve our goal of transforming the treatment of ASCVD, we are developing a pipeline of single-course gene editing treatments that leverage multiple breakthroughs of 21st century biomedicine—human genetic analysis, gene editing, mRNA-based therapies and LNP-mediated delivery. We believe our approach benefits from the following potential advantages:

- *Validated liver targets implicated in ASCVD risk:* Our approach specifically targets genes that are predominantly expressed in the liver and have been validated through human genetics research. Naturally occurring mutations in each of these target genes are associated with a reduced risk of ASCVD. Our gene editing programs are designed to mimic these natural resistance mutations to turn off specific genes in the liver implicated in the risks of CVD. Such resistance mutations in PCSK9, even in adults with homozygous mutations and complete PCSK9 protein deficiency, do not appear to have any serious adverse health consequences. Furthermore, there is established human pharmacologic proof-of-concept and positive tolerability profiles with other modalities targeting these genes, such as mAbs, siRNA and antisense oligonucleotides.
- *Potent, durable and life-long lowering of blood lipids through a single-course treatment:* We are leveraging gene editing technologies, including base editing, to make a permanent change in the target gene and disrupt the production of specific proteins that cause ASCVD. The durability of a gene editing approach appears to hold true in tissues with cell turnover, such as the liver, since the edit is passed on as cells divide. With VERVE-101, we are leveraging base editing with the goal of potently and permanently reducing blood lipids in order to create the potential for a life-long therapeutic outcome. In an ongoing preclinical proof-of-concept

study in NHPs using a precursor formulation of VERVE-101, we observed a 59% reduction in blood LDL-C at two weeks after treatment, with LDL-C reduction maintained at an average of 62% at ten months. In another preclinical proof-of-concept study in NHPs, we observed that a single administration of a precursor formulation targeting ANGPTL3 resulted in a 64% reduction in blood triglycerides at two weeks after treatment, with triglyceride reduction maintained at an average of 69% at ten months. We believe that our gene editing approach has the potential to potently and durably lower blood lipids throughout a patient's lifetime, thereby reducing their risk of ASCVD.

- *Designed and optimized to reduce or avoid safety risks:* To optimize the safety profile of our gene editing programs, we utilize non-viral LNP delivery of a gene editor to the liver due to the potentially superior safety profile of LNPs compared with available viral delivery approaches, specifically the minimization of genome integration risk and immunogenicity. In addition, we use base editing for our initial programs, which enables highly precise editing at the single base pair level and minimizes the risks of unwanted DNA modifications associated with double-stranded breaks from nuclease-based editing approaches. Finally, we extensively screen pairs of gene editors with guide RNA, or gRNA, in human cells, mice and NHPs to maximize the likelihood that our gene editing programs will have limited or no off-target editing effects. For VERVE-101, we have identified a base editor paired with a gRNA targeting PCSK9 and have not observed any significant off-target editing in preclinical studies using primary human hepatocytes.
- *A suite of complementary single-course gene editing treatments to broadly reduce blood lipids and ASCVD risk:* We are focused on targeting distinct pathways implicated in elevated blood lipid levels and related ASCVD risk. VERVE-101, our lead program, is designed to target the PCSK9 gene, a validated regulator of blood LDL-C levels. Our second program targets the ANGPTL3 gene, a regulator of both cholesterol and triglycerides that contributes to ASCVD risk independent of the PCSK9 pathway.
- *Potential to manufacture our programs in a scalable manner to reach a broad population:* We have designed our single-course treatments as LNPs encapsulating mRNA and gRNA, a similar construction to that used in two recent mRNA-based vaccines granted Emergency Use Authorization by the FDA for the prevention of COVID-19. We believe we will benefit from the rapid increase in investment, validation and real-world application of these technologies on a global scale as a result of the COVID-19 pandemic, which should enhance our potential to manufacture our gene editing programs for use with a broad patient population. We believe that scalable manufacturing is paramount to unlocking the true potential of our single-course gene editing treatments to tackle the worldwide burden of ASCVD.

Our strategy

To achieve our vision of developing gene editing medicines that transform treatment for patients with CVD from chronic management to single-course gene editing medicines, we are executing a strategy with the following key elements:

1. *Employ a stepwise approach to realize the full potential of VERVE-101, with initial development for the treatment of patients with HeFH followed by expansion to the broader population of patients with or at risk for ASCVD.* We are pioneering a new approach with single-course gene editing medicines aimed at transforming the care of patients with or at risk for ASCVD. We are initially developing VERVE-101 for the treatment of HeFH, a genetic cardiovascular disorder that causes life-long elevated LDL-C levels and leads to early-onset ASCVD. If we successfully develop VERVE-101 for the treatment of patients with HeFH, we believe it could also be used to treat the broader population of patients with established ASCVD. Ultimately, we believe these treatments could be potentially developed for administration to people at risk for ASCVD as a preventative measure. We have initiated IND-enabling studies with VERVE-101, and plan to submit an IND for the treatment of patients with HeFH in 2022.

2. *Expand our pipeline of gene editing treatments within ASCVD and beyond to additional CVD indications*. We are currently developing two gene editing programs focused on targeting two independent pathways controlling blood lipids implicated in ASCVD risk—PCSK9 and ANGPTL3. We envision expanding beyond our PCSK9 and ANGPTL3 programs to develop a suite of single-course gene editing medicines that comprehensively and robustly address additional independent causes of CVD. We believe our approach may be applicable to additional CVD indications with high unmet need driven by mutations in target genes expressed in the liver.

3. *Leverage our expertise and access to multiple gene editing technologies to become the leader in gene editing for CVD.* We believe that the deep expertise of our team in human genetics, gene editing and off-target analysis combined with multiple in-licensed technologies, including base editing and CRISPR nucleases, positions us to be able to develop single-course gene editing medicines designed to make a precise, predictable and permanent change in a target gene for the treatment of CVD. For each new target, our expertise allows us to systematically evaluate each gene editing technology in primary human hepatocytes, mice and NHPs to identify the optimal approach based on potential efficacy and safety. We believe that our singular focus on developing gene editing medicines to treat CVD enables us to move rapidly and has culminated in the first ever proof-of-concept data in NHPs for base editing.

4. *Advance LNP delivery technology leveraging both external as well as internal LNP capabilities to target the liver*. On a target-by-target basis, we evaluate the best options for non-viral delivery from our external partnerships or our internal LNP discovery platform. For our lead program, VERVE-101, we have licensed LNP technology from Acuitas, an established company with a track record of partnering and developing LNPs for clinical use. Additionally, our internal team's expertise in biodegradable LNP chemistry, formulation and manufacturing has allowed us to develop and screen potent, liver-directed LNPs, including novel liver-targeting GalNAc LNPs, which may offer superior delivery in certain CVD patient populations.

5. *Prioritize rapid iteration of product candidates in NHP preclinical models as an early development strategy*. We believe that studies in NHPs are a powerful predictor of efficacy in humans for gene editing and LNP delivery to the liver. Our preclinical validation approach prioritizes NHP experiments early in the process, enabling us to rapidly optimize drug product development to identify a lead candidate to take into clinical development. With VERVE-101, the bulk of our preclinical studies have been performed in NHPs, allowing us to establish the pharmacodynamic relationship between liver editing and resulting reductions in circulating PCSK9 protein and LDL-C that we believe will translate into a similar profile in humans.

6. *Develop manufacturing capabilities to produce in vivo gene editing medicines at scale.* We are currently working with Good Manufacturing Practice, or GMP, vendors to produce all components of our drug candidates for our first clinical trial batches. We have successfully executed batches at near clinical scale through our vendors and are on-track to produce clinical batches for our planned first-in-human trial of VERVE-101. We have also developed proprietary production processes designed to yield high-purity and high-quality mRNA that are crucial for *in vivo* liver editing applications. We are continuing to invest in building internal manufacturing capabilities for mRNA and LNP production, in order to fulfill our vision of delivering gene editing medicines to millions of patients with CVD.

7. *Build the leading cardiovascular gene editing company by maintaining a dynamic culture that attracts and retains a talented and collaborative team.* We have attracted a talented team of scientists, cardiologists, drug developers and business professionals, as well as experts in the fields of human genetics, gene editing technologies, mRNA biology, off-target analysis and genetic medicine delivery modalities.

Developing gene editing medicines that transform the care of CVD requires that we solve many new and complex problems as a natural component of the drug discovery and development process. Our vision, values, talent and strategy are essential to maximizing our ability to address these problems and bring forward a new approach to treating the leading cause of the death in the world.

Our approach

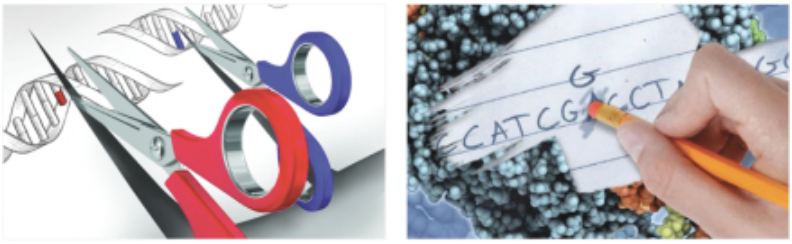
We are employing a tailored approach aimed at developing single-course gene editing medicines to transform treatment for patients with CVD. Our gene editing programs target validated genes in the liver that are supported by extensive human genetics and human pharmacology data and are known to be implicated in CVD. We use base editing for our initial programs, a next-generation gene editing approach that enables precise and efficient editing at the single base level in the genome without making a double-stranded break in the DNA. Our gene editing programs consist of LNPs that encapsulate mRNA encoding for a gene or base editor as well as a gRNA targeting the gene of interest expressed in the liver. We believe that the following key elements of our approach will help us achieve our goal of delivering gene editing treatments on a global scale for millions of patients with CVD.

Editor selection

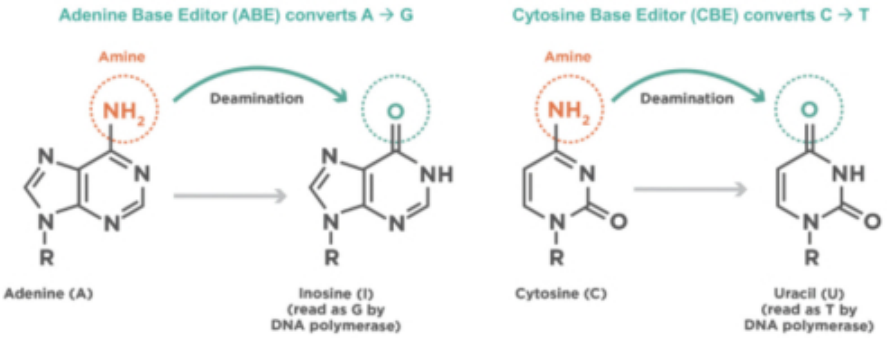
We selected gene editing as the core technology to develop our single-course gene editing treatments for CVD because we believe it offers the potential for durability of effect and versatility in the type of genetic modification compared to other genetic medicine approaches, including gene therapy and RNA therapeutics. We have access to multiple gene editing technologies through licenses including base editing and CRISPR nucleases. We believe having the flexibility to apply different gene editing technologies to different single-course treatments for CVD enables us to identify the best potential option for any given therapeutic application.

CRISPR-Cas is a form of nuclease-based gene editing that enables targeting of genomic DNA sequences with high specificity in human cells by assessing for a match between the gRNA sequence and the DNA sequence. The gRNA allows the Cas protein to recognize a complementary part of the DNA sequence. Once RNA-DNA pairing occurs, the Cas enzyme makes a double-stranded DNA break, and the cell's natural DNA repair mechanisms work to make changes or repair the genome. When the repair is faulty, there can be disruption of a target gene, known as a knockout. CRISPR-Cas is effective at knocking out, or silencing, a targeted gene through disruption. However, potential limitations of standard CRISPR-Cas gene editing include lack of predictability in genetic outcomes and potential toxicities associated with double-stranded DNA breaks.

Base editing is a next-generation gene editing approach that enables precise and efficient editing at the single base level in the genome without making a double-stranded break in the DNA. If CRISPR-Cas gene editing approaches are akin to "scissors" for the genome, base editors are akin to "pencils," erasing and rewriting one letter in a gene, as illustrated in the graphic below.



Through our license agreement with Beam, we have access to two different types of base editors—adenine base editors, or ABEs, and cytosine base editors, or CBEs, each of which has a modified Cas9 protein bound to a gRNA, retaining the ability to target a genomic sequence, yet avoiding double-stranded DNA breaks. The base editors are distinguished by the kind of deaminase, the base editing enzyme that carries out the chemical modification, that is fused to Cas9. The deaminase makes a predictable chemical modification, called deamination, of the amine group on either an adenine, or A, base or a cytosine, or C, base as shown in the figure below.



For our lead programs for PCSK9 and ANGPTL3, we are using an ABE to convert an amine group of A to an inosine, or I, base, which is read by DNA polymerase as a guanine, or G, base, leading ultimately to an A-to-G spelling change. Once the initial modification has occurred, the intermediate DNA consists of an edited strand, containing an I at the target site, and an unedited strand with a thymine, or T, base. The I:T base pair is a mismatch, which the cell will normally attempt to repair in a process that can potentially lose the edit. In order to preserve the editing, our base editors cleave the unedited single strand of the DNA, referred to as nicking, rather than creating double-stranded breaks. The presence of the nick on the unedited strand, however, increases the efficiency of editing by inducing the cell to use the newly edited strand, and not the unedited strand, as the template for repair, resulting in an I:C base pair. Upon DNA repair or replication, the I is read as a G, resulting in a G:C base pair, and the permanent conversion of an A:T base pair to a G:C base pair is completed. This single base pair change at the specific site within the PCSK9 or ANGPTL3 gene alters the gene in such a way that no functional PCSK9 or ANGPTL3 protein is made, disrupting its role in maintaining elevated levels of circulating blood lipids.

Target selection

We focus on validated genes in the liver-cardiovascular axis, which are genes predominantly expressed in the liver and where disrupting protein production or introducing a beneficial mutation may effectively treat an underlying cause of CVD. When considering targets for our programs, we evaluate the following criteria:

- human genetic evidence that loss-of-function, or LoF, mutations confer resistance to disease;
- human genetic evidence that LoF mutations do not have adverse effects, and that homozygous LoF, inheriting two mutant alleles, are well tolerated;
- human clinical proof-of-concept data for targeting with other modalities to support the potential safety and efficacy of permanent gene or base editing;
- technical efficiencies, such as liver-predominant expression and known estimates of the pharmacodynamic relationship between target protein and therapeutic effect;

- existence of circulating protein biomarkers for efficacy, clinical biomarkers of disease modulation, and the availability of appropriate preclinical disease models; and
- clear unmet medical need and development rationale for the target indications.

Evaluating for off-target editing

Gene editing enables precise alterations at specific locations in the genome but has the potential to make alterations at undesired locations, known as off-target editing. Base editing has inherently fewer risks for off-target editing than CRISPR-Cas nuclease editing given the precision and efficiency of editing at the single base pair level and ability to make the edit without making a double-stranded DNA break.

Our approach to minimizing off-target editing involves the use of comprehensive, sensitive and state-of-the-art methods to identify potential off-target sites with our editors. These include computational methods that predict off-target sites based on sequence similarity to the on-target site. We also use biochemical methods in which either DNA extracted from cells or synthetic DNA is treated with a nuclease or base editor *in vitro* and edited sites are identified by next-generation DNA sequencing. A key part of our approach includes the use of a new technique called ONE-seq, which was developed by Dr. Keith Joung, one of our founders. ONE-seq is an *in vitro* method to screen tens of thousands of potential sites in the genome where editing may occur. We believe that our internal expertise in the application of multiple innovative techniques to evaluate off-target editing gives us a leading position in the field and the ability to rapidly advance future programs.

Lipid nanoparticle delivery selection

Gene editing treatments require intracellular delivery of mRNA and gRNA molecules into the target cell type—in our case, hepatocytes in the liver—and all of our programs utilize a non-viral approach, LNPs, for delivery. LNPs are well-established, both by approved products and by clinical trials conducted by others with other agents, to preferentially accumulate in the liver after systemic administration. We have chosen non-viral LNP delivery due to the potentially superior safety profile compared with available viral delivery approaches, as well as the high efficiencies of liver editing achievable with LNPs due to their natural tropism to the liver.

Non-viral delivery to the liver with LNPs confers potential advantages, including:

- protection of the mRNA and gRNA payloads while in circulation in the blood;
- transient expression of gene editing proteins, allowing more control over the editing process;
- transient expression of the editing protein and rapid completion of the editing process within days, minimizing immunogenicity;
- absence of DNA or viral components, avoiding exogenous DNA capable of inserting into the genome;
- rapid degradation of drug product within one to two weeks, supporting the potential for long-term safety;
- known, manageable infusion-related side effects; and
- cost-effective manufacturing with potential to efficiently scale to reach millions of patients.

On a target-by-target basis, we evaluate the optimal LNP delivery options from either external partnerships or our internal LNP discovery platform. For our lead program, VERVE-101, we have licensed LNP technology from Acuitas, an established company with a track record of partnering and developing LNPs for clinical use. Our collaboration with Acuitas included serial NHP studies to evaluate various LNP formulations and RNA payloads prior to selecting an Acuitas LNP for VERVE-101.

We view our internal LNP discovery platform as an important source of delivery technology for future therapeutic programs. We are optimizing our internal LNP discovery platform by focusing on:

- strategies to enhance delivery to the liver in certain CVD patient populations, such as patients with HoFH, in whom LNP-mediated delivery may be challenging;
- improved efficiency of delivery to the liver, such that lower doses of RNA payload could be used;
- wider therapeutic indices to optimize the benefit-risk profile of our product candidates; and
- improved stability and potential for powder formulation enabling easier storage for commercial application.

To date, our LNP discovery platform has yielded novel proprietary ionizable lipids that we have designed, synthesized and evaluated for their potential to deliver gene editing payloads to the liver in mice. We are further optimizing and scaling up such formulations for evaluation in NHPs. We have also developed novel targeting ligands that when added to LNPs allow for more efficient delivery of RNA payloads to the liver. We believe that our internal LNP discovery platform will yield improvement in our product candidates for current and future programs.

Single-course therapy

We are designing our single-course gene editing treatments to be administered as single-dose regimens through intravenous infusion, which is supported by data generated in our preclinical studies in NHPs. However, an advantage of using LNPs is the potential for split-dosing. In the case of our gene editing programs, we may elect to dose patients using a single, short course consisting of a limited number of split-doses over a short period of time to improve safety, efficacy or both. In patients who may not receive an adequate therapeutic effect with a single course of treatment, our approach may enable the option to re-dose. Patisiran, an approved LNP-encapsulated siRNA, is chronically administered without safety and efficacy concerns for patients with transthyretin amyloidosis, or ATTR. This is in contrast to viral vectors, which face safety and efficacy challenges with re-dosing.

The value of a single-course gene editing treatment will be determined by the safety, potency and durability of its desired effect. We believe a single-course treatment with VERVE-101 could durably lower LDL-C throughout the lifetime of patients with or at risk for ASCVD. Our gene editing treatments are designed to make a permanent change in the DNA of liver cells. With VERVE-101, transient expression of ABE protein in hepatocytes is designed to lead to permanent editing of the PCSK9 gene. Since liver cells turn over predominantly through division of hepatocytes that themselves will carry the PCSK9 edit, we believe that the efficacy resulting from the edit will be durable.

This stands in contrast to gene therapy, where the therapeutic benefit has been challenged by a lack of durability. Gene therapies are often designed to express exogenous mRNA by viral delivery or viral expression of mRNA. The durability of therapeutic effect can be limited by the loss of mRNA expression from a viral vector that does not integrate into the genome. This leads to either a reliance on viral integration at unpredictable sites in the genome, which can lead to safety challenges, or on repeat dosing that has its own challenges with viral delivery.

We believe that single-course gene editing treatments could provide durable and transformative outcomes, producing sustained health benefits for patients with CVD.

Scalable manufacturing

By designing our gene editing treatments as LNPs encapsulating mRNA and gRNA, we expect to benefit from the potential for scalable and cost-effective manufacturing processes enabling the opportunity to treat millions of patients with CVD.

Our product candidates are similar to two validated and approved drug classes: LNP-encapsulated siRNAs, such as patisiran, and LNP-encapsulated mRNA-based COVID-19 vaccines, which are LNPs containing a long mRNA molecule for the spike protein of SARS-CoV-2. Significant and ongoing investments are being made by multiple organizations to enhance the supply chain for all components and processes related to mRNA production, LNP production and fill-finish, especially in light of the intense worldwide efforts to manufacture massive quantities of COVID-19 vaccines. We believe we will ultimately benefit from the increased global capacity for LNP-encapsulated mRNA production over the next several years.

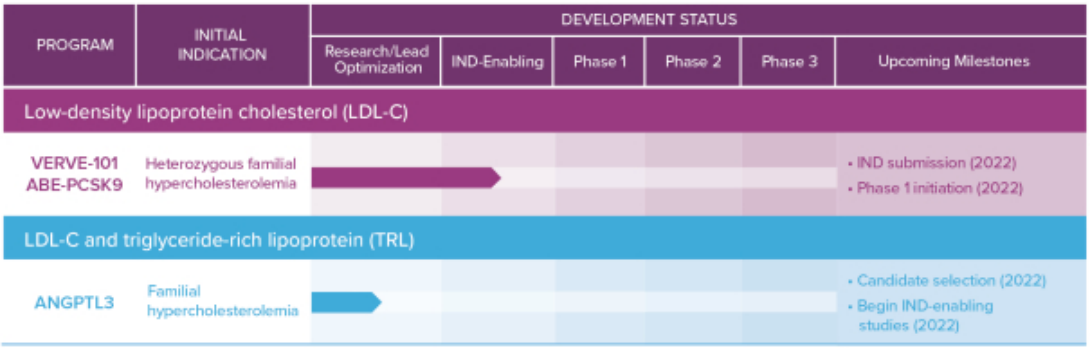
We are currently working with GMP vendors to produce all components of our drug candidates for our first clinical trial batches. These include plasmid DNA preparation, mRNA production via *in vitro* transcription reactions, gRNA synthesis via solid state synthesis, lipid synthesis and LNP formulation and fill finish. Working closely with these vendors, we have successfully executed batches at near clinical scale and are on track to produce the clinical batch for our planned first-in-human trial of VERVE-101.

We are also investing in the buildout of internal process development capabilities in mRNA production and LNP formulation, which we believe will become one of our core competencies in the future. The goals of this internal process development capability are to scale up plasmid DNA, mRNA and LNP production batches, to make improvements in order to enhance quality, consistency and stability, and to reduce costs. Further, we are investing in analytical method development including bioactivity and potency assays that will be critical to further product development, batch comparability assessments and additional manufacturing growth.

Our gene editing programs

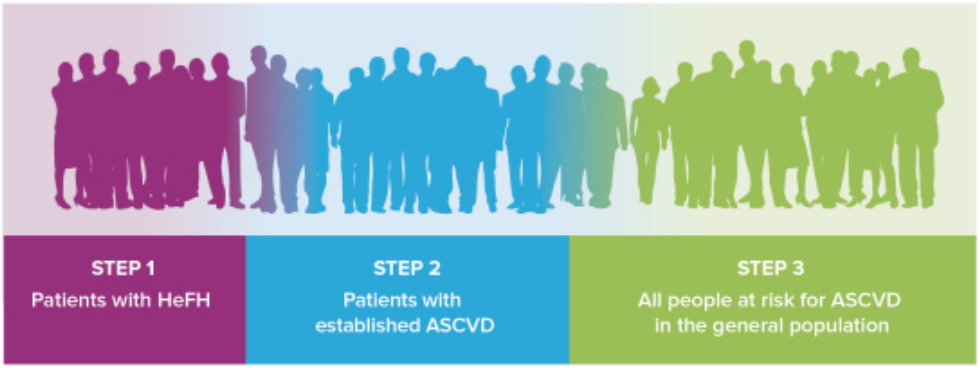
We are advancing a pipeline of single-course *in vivo* gene editing programs intended to durably turn off genes in the liver implicated in CVD. Our gene editing programs consist of LNPs that encapsulate mRNA encoding for a gene editor as well as a gRNA targeting the gene of interest expressed in the liver. Our initial pipeline is focused on two genes, PCSK9 and ANGPTL3, implicated in the control of blood lipids. We are developing these gene editing treatments initially for the treatment of patients with forms of FH, which is an autosomal dominant genetic disorder, leading to life-long severely elevated blood LDL-C and increased risk of early-onset ASCVD. Patients with FH have mutations predominantly in the LDLR gene that affect the ability of liver cells to remove LDL from the circulation. FH manifests clinically in two forms: the more common heterozygous form, known as HeFH, and the rarer homozygous form, known as HoFH.

The following graphic summarizes our pipeline of programs.



Our most advanced product candidate, VERVE-101 targeting the PCSK9 gene, is in IND-enabling studies for the treatment of patients with HeFH, which affects approximately 1.3 million people in the United States, 2.1 million in the European Union and the United Kingdom and approximately 31 million worldwide. We intend to submit an IND to the FDA and comparable foreign regulatory authorities in 2022, followed by initiation of clinical development for patients with HeFH. Our approval pathway is subject to discussions with the FDA and other regulatory authorities; however, we note that FDA-approved lipid-lowering therapies, including for FH, have used LDL-C reduction as a primary endpoint in registrational trials. Outcome studies have not been required for initial approval of these other therapies in patients with FH.

We are strategically developing VERVE-101 initially in patients with HeFH, recognizing that the unmet need is highest in those patients and the benefit-risk profile may be more favorable. We intend to use a stepwise clinical development plan for VERVE-101 as depicted in the illustration below, evaluating efficacy and safety in higher-risk populations first, and then if successful, expanding into broader population of patients with established ASCVD, and ultimately to those at risk for ASCVD in the general population.



We plan to develop our second program targeting the ANGPTL3 gene using a similar stepwise approach. We plan to initially develop this program for the treatment of each form of FH, including HoFH, which affects approximately 1,300 patients in the United States, as well as the more prevalent HeFH indication. We plan to nominate a lead development candidate for our ANGPTL3 program and initiate IND-enabling studies for this program in 2022.

We intend to develop a broad pipeline of gene editing programs for patients with ASCVD, targeting distinct pathways implicated in elevated blood lipid levels and related ASCVD risk. In addition to ASCVD, we believe our gene editing approach could have broader applications for additional CVD indications, including certain forms of cardiomyopathy.

Familial hypercholesterolemia: our initial focus for our single-course gene editing treatments

FH is a genetic disorder where patients have life-long severely elevated blood LDL-C, which can lead to increased risk of early-onset ASCVD. FH is an autosomal dominant disease often caused by a mutation in the LDLR gene. Individuals with FH may harbor one mutant allele and are thereby heterozygous for the disease, known as HeFH, or two mutated alleles and are therefore homozygous for the disease, known as HoFH. HoFH is typically more severe than HeFH.

Men and women with untreated HeFH typically have LDL-C levels ranging from approximately 200 to 400 mg/dL and develop ASCVD before age 50 and 60, respectively. The estimated prevalence of HeFH is roughly one in 250, which translates to about 1.3 million patients in the United States. Men and women with HoFH have LDL-C levels above 500 mg/dL and typically develop ASCVD before the age of 20 and, without intervention, die before age 30. The estimated prevalence of HoFH is roughly one in 250,000, which translates to about 1,300 patients in the United States.

FH is clinically diagnosed based on a combination of factors, including the concentration of blood LDL-C, physical findings, personal or family history of hypercholesterolemia and early onset of ASCVD. Extensor tendon xanthomas, typically Achilles, subpatellar and hand extensor tendons, with extremely elevated LDL-C levels are considered specific for FH. However, FH is often silent until the development of a heart attack at a young age, at which time a family history of ASCVD and elevated LDL-C levels are often the only findings. In an analysis of the FH phenotype, which typically means LDL-C levels of greater 190 mg/dL, from six prospective cohort studies with 30-year follow-up, the FH phenotype was associated with up to a five-fold elevated 30-year ASCVD risk. ASCVD development was accelerated in those with the FH phenotype by 10 to 20 years in men and 20 to 30 years in women. In HoFH, patients typically develop atherosclerosis in childhood, initially in the aortic root, causing supravalvular aortic stenosis, and then extending into the coronary arteries. If the LDL-C level is not effectively reduced, people with HoFH die prematurely of ASCVD. The severity of atherosclerosis in FH is proportional to the extent and duration of elevated blood LDL-C levels.

Although the diagnosis of FH can be made on the basis of clinical features, genetic testing may offer additional insight into cardiac risk and diagnosis. Recent analysis of data from more than 26,000 individuals suggests that at any given LDL-C level, having an identified FH mutation is associated with significantly higher ASCVD risk than having the same LDL-C level but no apparent pathogenic FH mutation. In this analysis, individuals with an LDL-C level greater than or equal to 190 mg/dL and no pathogenic FH mutation had a six-fold higher risk of ASCVD than the reference group with an LDL-C level less than or equal to 130 mg/dL. However, individuals with an LDL-C level greater than or equal to 190 mg/dL and a pathogenic FH mutation were at a 22-fold higher risk of ASCVD than the reference group, possibly reflecting greater atherogenicity of life-long LDL-C elevation in FH compared with LDL-C elevation acquired later in life.

While dietary and lifestyle changes are important for LDL-C lowering in patients with FH, multidrug treatment is often required to achieve recommended LDL-C levels. The recommended LDL-C levels for FH patients are similar to those for non-FH patients with ASCVD. Treatment for FH patients tends to start earlier than those with or at risk for ASCVD without FH, and typically follows a more aggressive course with multidrug treatment given the elevated risk of early-onset ASCVD. While FH patients are treated with medicines similar to those used for non-FH patients, the chronic care for FH patients is typically more burdensome with earlier intervention and

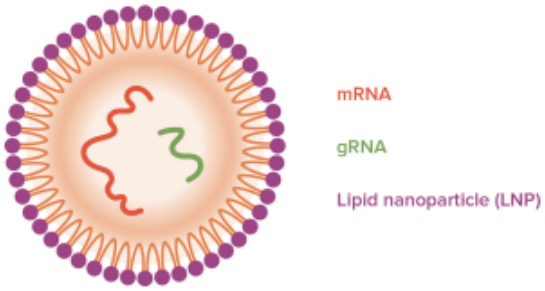
more drugs. In addition, for many patients, especially those with HoFH, their LDL-C levels remain inadequately controlled and do not reach goals recommended by clinical treatment guidelines.

VERVE-101: PCSK9 program

Our lead product candidate, VERVE-101, is designed to be a single-course *in vivo* gene editing treatment targeting the PCSK9 gene. We plan to develop VERVE-101 initially for patients with HeFH, and, if successful, to expand development for the broader population of patients who have established ASCVD.

In patients with HeFH, a genetic mutation in the LDLR gene down-regulates LDLR expression, which limits the ability of liver cells to remove LDL from the bloodstream, resulting in extremely high LDL-C levels in the blood. Over time, high LDL-C builds up in the arteries, leading to formation of atherosclerotic plaque, reduced blood flow or blockage and ultimately heart attack or stroke. We believe that inactivation of the PCSK9 gene will result in lower PCSK9 protein levels, thereby increasing LDLR expression, leading to lower LDL-C levels and reduced risk for ASCVD. Clinical trials conducted by others evaluating PCSK9 inhibitors have suggested that targeting PCSK9 has the potential to work in patients with HeFH regardless of the underlying mutation.

VERVE-101 consists of an LNP encapsulating an mRNA encoding an ABE and a gRNA, as depicted in the image below. Four lipid components assemble along with the RNAs to form a dense, stable LNP that is approximately 60 nanometers in diameter.

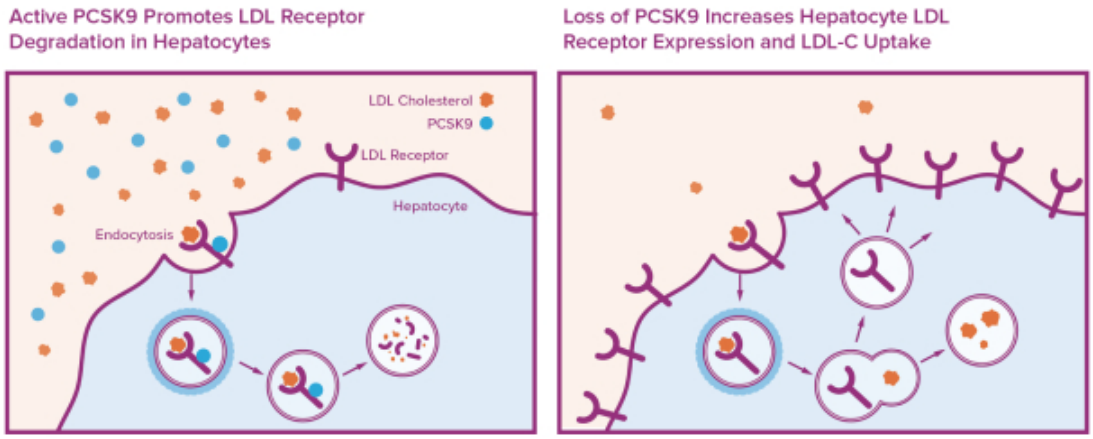


VERVE-101 is designed to be infused intravenously into the patient over approximately one to two hours, and then accumulates in the liver. Prior to administration of VERVE-101, a pre-medication regimen is given that consists of antihistamines and steroids. Once in the liver, VERVE-101 is brought into hepatocytes and escapes into the cytoplasm where the base editor protein is transiently expressed. The gRNA then binds to the base editor protein, and the complex is carried into the nucleus to locate the gene target specified by the 20-nucleotide spacer sequence of the gRNA. The ABE binds to the DNA and makes a single A-to-G spelling change at the target site, thereby turning off the PCSK9 gene. The ABE mRNA construct is codon-optimized and contains chemical modifications to reduce the potential for mRNA-mediated immune responses. The gRNA sequence has several chemical modifications to enhance *in vivo* stability to endonucleases and exonucleases.

PCSK9 as a target

The PCSK9 gene plays a critical role in the regulation of blood LDL-C through its regulation of the LDLR gene. The normal function of PCSK9 is depicted in the figure below on the left. The PCSK9 gene produces a protein in the liver that is released into the blood. LDLR is present on the surface of liver cells and binds to LDL and removes LDL from circulation. The LDL bound to LDLR is taken up by liver cells to enable the breakdown of LDL particles. LDLR is then recycled back to the surface of the cell, enabling the process of LDL uptake to recur. PCSK9 protein in the blood interrupts this LDLR recycling process. Specifically, PCSK9 protein in the blood binds to LDLR and targets

LDLR for destruction. In doing so, PCSK9 reduces the number of LDLRs on the liver cell surface, thereby reducing the ability of the liver to clear LDL from the blood. The figure on the right depicts a loss of PCKS9 gene function, which results in less PCSK9 protein and thereby increased LDLR expression and uptake of LDL-C.



As reported in *The New England Journal of Medicine*, one study found that adults with naturally occurring LoF mutations in the PCSK9 gene had LDL-C levels that were 38 mg/dL lower than adults without the mutation, and those with the mutation had an 88% lower risk of ASCVD. Human genetic studies also showed that carrying naturally occurring loss-of-function mutations in one or both copies of the PCSK9 gene was not associated with serious adverse health consequences.

In addition to human genetic studies, human pharmacology studies have provided validation for PCSK9 as a target. The impact of PCSK9 inhibition on cardiovascular outcomes has been established by two large, randomized, double-blind, placebo-controlled studies of two approved mAbs that bind to PCSK9 protein and block its activity, the FOURIER trial and the ODYSSEY OUTCOMES trial. The FOURIER trial demonstrated that treatment with evolocumab in addition to background statin therapy over a median of 2.2 years reduced major cardiovascular events by an additional 15% in patients with established ASCVD. The ODYSSEY OUTCOMES trial demonstrated that treatment with alirocumab in addition to background statin therapy over a median of 2.8 years reduced major cardiovascular events by an additional 15% in patients with established ASCVD. Treatment with these mAbs demonstrated an approximately 60% reduction in LDL-C on average across clinical trials when compared with placebo treatment. Notably, in both trials, with the exception of injection site reactions, overall adverse event rates were similar between patients treated with placebo or drug, with no observed increase of new-onset diabetes, worsening glycemic control or neurocognitive adverse events.

The PCSK9 target has been further validated by inclisiran, which was approved by the EMA in 2020 and is being evaluated for approval by the FDA. In the ORION-9 trial, the pivotal Phase 3 trial of inclisiran in patients with HeFH, the percent change in the PCSK9 level after 510 days was a decrease of 60.7% in the inclisiran-treated group compared with baseline, which led to a reduction in LDL-C after 510 days of 39.7% compared to baseline.

We believe the human genetic studies and the human pharmacology with PCSK9 inhibitors provide substantial evidence that targeting PCSK9 is a potentially safe and effective approach to lower LDL-C and reduce ASCVD risk.

Preclinical studies

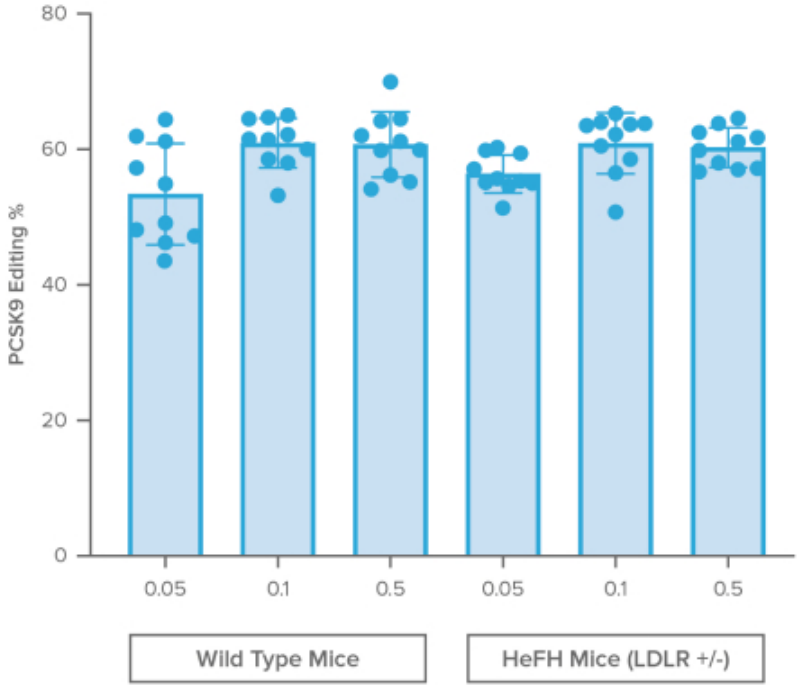
We discovered VERVE-101 based on extensive screening of a large library of gRNA candidates, evaluation of multiple LNP formulations and optimization of the ABE mRNA construct. We have tested a mouse surrogate of

VERVE-101, precursor formulations of VERVE-101, which we refer to as our ABE-PCSK9 precursor formulation, and VERVE-101 itself *in vitro* and *in vivo* across multiple animal models. In these studies, we have observed the following:

- high PCSK9 gene editing activity in the liver by a mouse surrogate of VERVE-101 in both wild type mice and heterozygous LDLR knockout mice, a well-established mouse model of HeFH;
- ten-month NHP durability data for blood PCSK9 protein and LDL-C reduction following treatment with our ABE-PCSK9 precursor formulation, with average reductions of 89% of PCSK9 protein and 62% for LDL-C;
- dose-responsive liver PCSK9 gene editing, blood PCSK9 protein reduction, and LDL-C reduction in NHPs, with a 1 mg/kg dose of VERVE-101 achieving approximately 71% editing, approximately 85% reduction in blood PCSK9 protein and approximately 64% reduction in LDL-C;
- VERVE-101 editing occurred predominantly in the liver and within 24 hours of treatment in NHP studies;
- administration of VERVE-101 to NHPs caused transient, mild elevations in liver function tests that entirely resolved within two weeks; and
- no significant off-target editing in primary human hepatocytes.

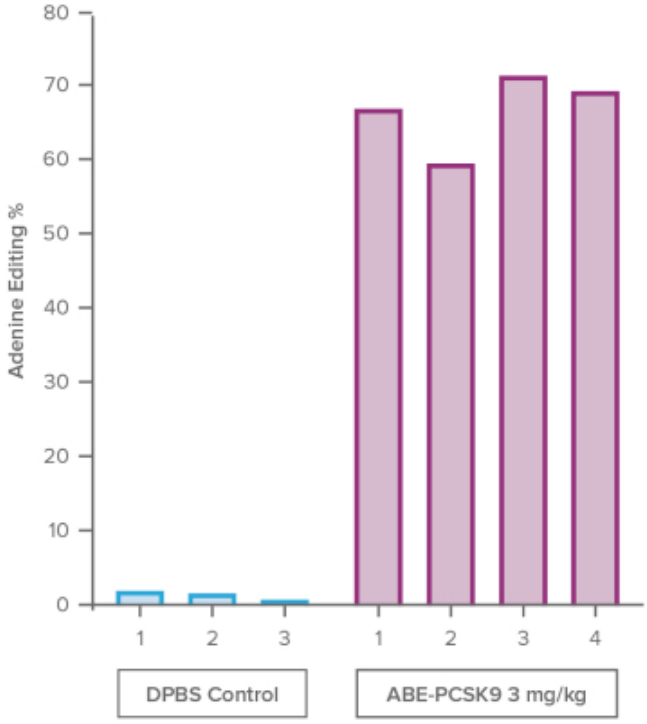
In vivo validation with ABE-PCSK9 mouse surrogate

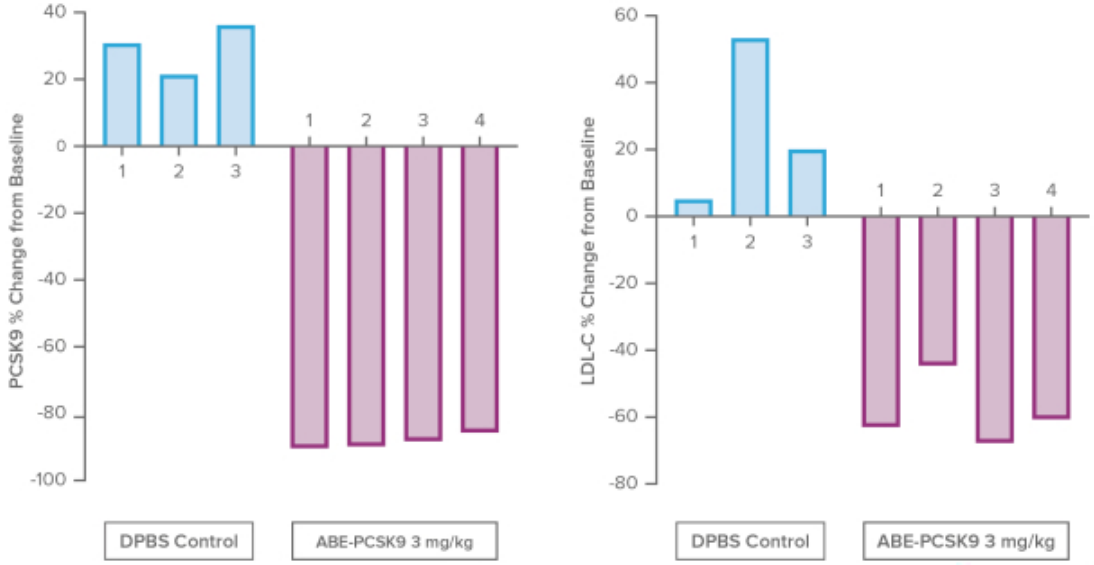
Our initial target patient population for VERVE-101 is patients with HeFH who produce reduced levels of functional LDLR, which results in increased levels of LDL-C in the blood. We utilized heterozygous LDLR knockout mice to model the HeFH disease state. A mouse surrogate version of VERVE-101 was developed for use in this model comprising a mouse surrogate gRNA targeting the ortholog of the same PCSK9 site, along with two components identical to VERVE-101—the ABE mRNA and LNP. As shown in the figure below, we observed that doses of 0.05, 0.1 and 0.5 mg/kg of the mouse surrogate of VERVE-101 administered once to wild-type and heterozygous LDLR knockout mice resulted in similar and robust amounts of PCSK9 editing in the liver.



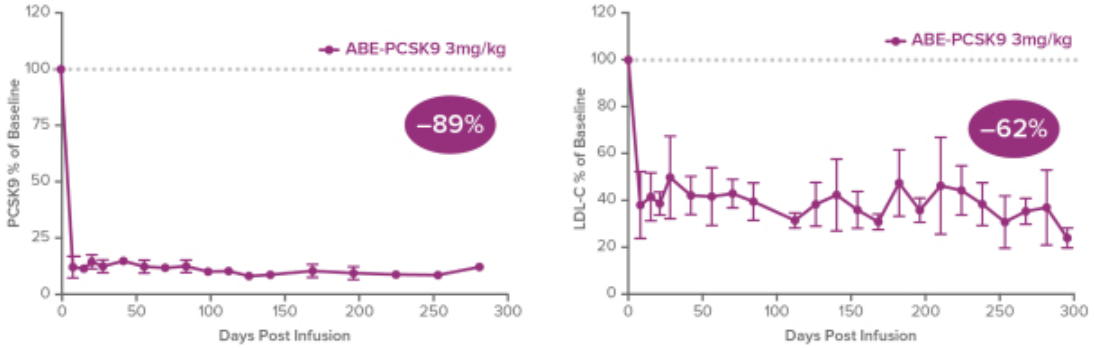
NHP validation with ABE-PCSK9 precursor formulation

We then applied this approach in an NHP model to establish preclinical proof-of-concept using an ABE-PCSK9 precursor formulation. In this study, which is ongoing, we administered a single dose to healthy NHPs. In the figures below, each treated NHP is represented by a purple bar and each vehicle treated control is represented by a blue bar. Following a single treatment with our ABE-PCSK9 precursor formulation, we observed an average 67% editing of PCSK9 in whole liver tissue sampled through a liver biopsy two weeks after dosing, as shown in the first graph. This was accompanied by an average 89% reduction of blood PCSK9 protein and an average 59% reduction of blood LDL-C concentrations, as shown in the additional two graphs below.



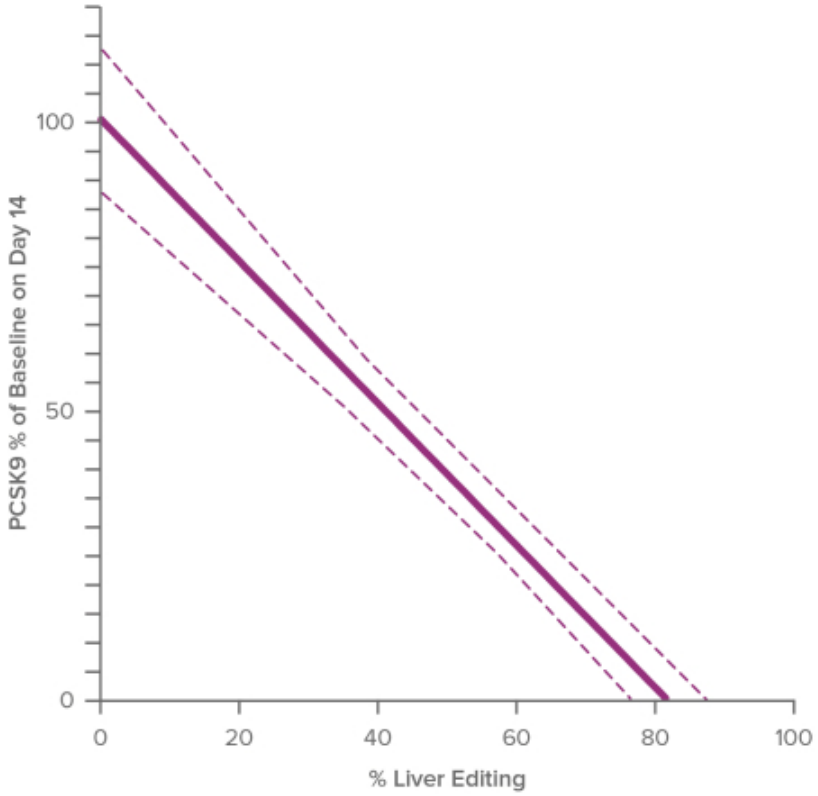


Importantly, in this preclinical study, we observed that the reductions in blood PCSK9 protein and blood LDL-C levels were durably maintained. As shown in the figures below, at ten months following a single intravenous administration of ABE-PCSK9, we observed that the NHPs continued to exhibit an average 89% reduction in blood PCSK9 protein and an average 62% reduction in blood LDL-C. If we are able to achieve similar reductions in PCSK9 protein levels in humans, we believe this could result in marked and sustained LDL-C reductions of approximately 60%, which would potentially offer superior cumulative LDL-C lowering to what has been clinically demonstrated with other PCSK9-targeting treatment modalities.



Turnover of mature hepatocytes in the liver is estimated to occur on average every 200 to 300 days. The source of new hepatocytes is not certain, but evidence suggests that mature hepatocytes are responsible for production of new hepatocytes during both homeostatic liver turnover and following liver injury. Less likely, a fraction of hepatocytes with greater regenerative capacity may exist in the liver. In either case, the 300-day durability data shown above in our preclinical studies with an ABE-PCSK9 precursor formulation suggest that the liver cells responsible for regeneration are edited at the PCSK9 gene site. In addition, we have not observed evidence of persistent inflammation or liver injury that might suggest more rapid hepatocyte turnover or immune-mediated clearance of edited hepatocytes.

We have explored the pharmacodynamics of liver editing and consequent effect on blood PCSK9 protein levels across a large number of iterative NHP studies. We have identified a linear relationship between editing of the PCSK9 gene in liver cells and blood PCSK9 protein levels. The figure below shows a best-fit line with confidence intervals representing a large number of data points from individual NHPs. In NHPs, we have achieved a reduction of greater than 60% in PCSK9 protein with a whole liver editing rate of approximately 50% to 55%. We believe that this relationship between whole liver editing and PCSK9 reduction should be similar in humans.



VERVE-101 preclinical efficacy data

Our preclinical studies of our ABE-PCSK9 precursor formulation led to the development of VERVE-101. In preclinical studies of VERVE-101 in healthy, wild-type NHPs, we have observed dose-dependent levels of editing of the PCSK9 gene in liver cells when administered as a single dose, with three NHPs evaluated per dose level. With a dose of 1 mg/kg, we observed whole liver editing levels of approximately 71%, as shown in the figure below, which we believe represents editing of the majority of hepatocytes. We also observed that the level of editing translated into dose-dependent reductions of both blood PCSK9 protein and blood LDL-C. At the 1 mg/kg dose, we observed a PCSK9 protein reduction of approximately 85% and a robust LDL-C reduction of approximately 64%.

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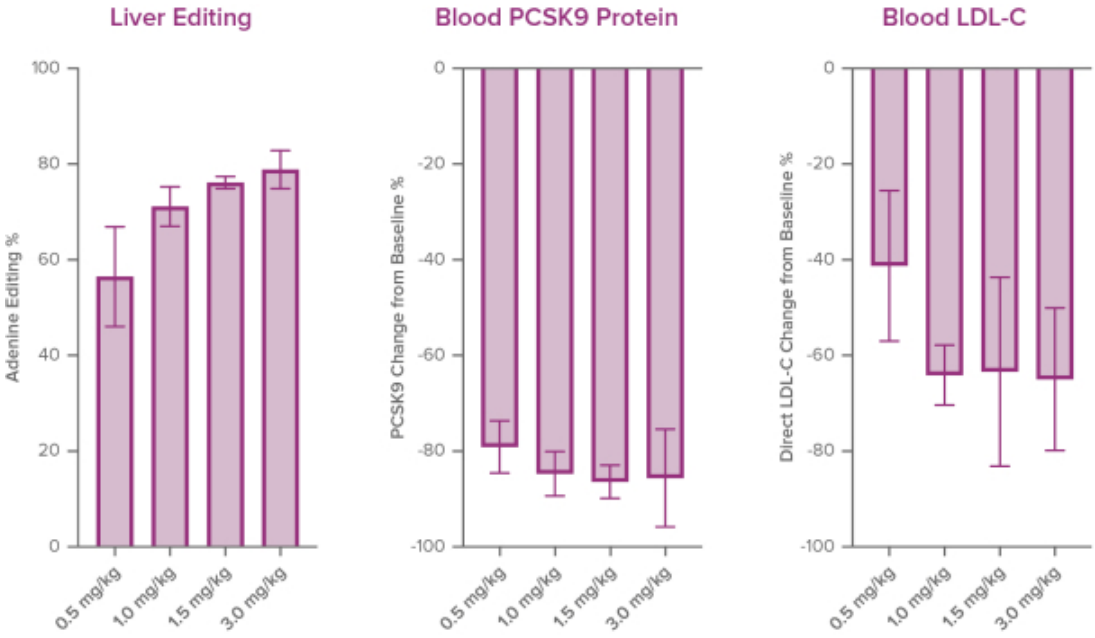
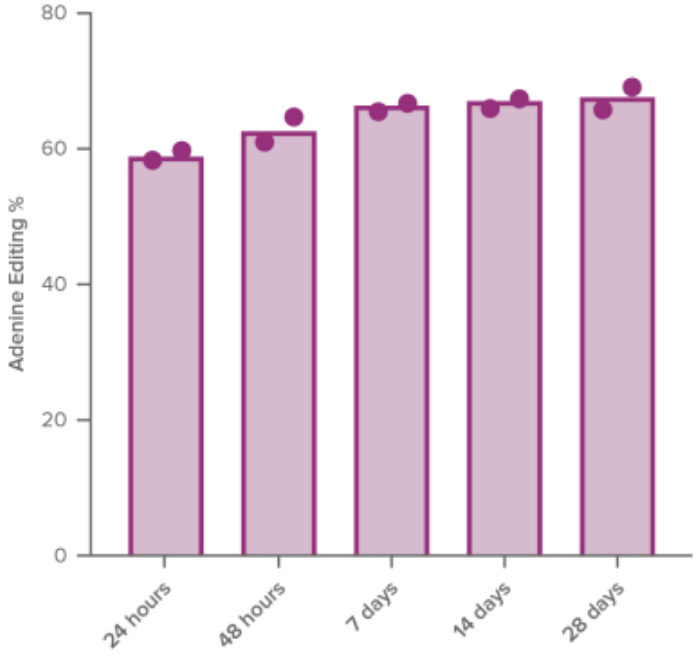


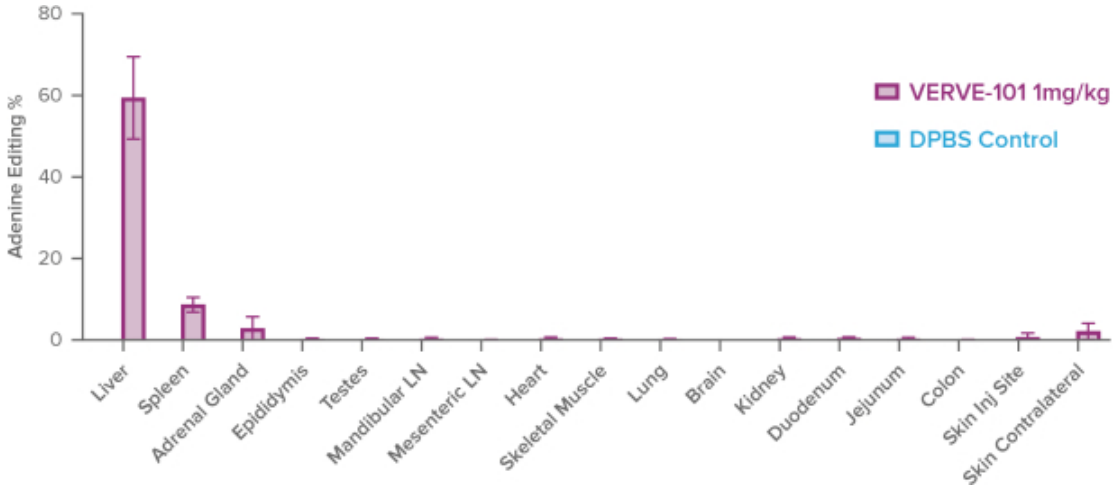
We observed that editing occurred quickly following dosing of VERVE-101 in NHPs, with the majority of the editing observed within one to two days of dosing. In the study, NHPs (N=2 per group) were administered the same 1 mg/kg dose, and necropsies were serially performed on day one, day two, day seven, day 14 and day 28. We observed high efficiency editing within 24 hours with minimal additional editing at subsequent time points as shown in the figure below.



The effects on blood PCSK9 protein and LDL-C reached their peak outcomes within two weeks of dosing. The major component of the LNP, the ionizable lipid, is designed to be biodegradable and to be eliminated from the blood within two weeks, and we observed that it was largely eliminated from the liver, to less than 10% of peak concentration, within two weeks of dosing. ABE mRNA levels in the liver decreased by 97% within one week of dosing.

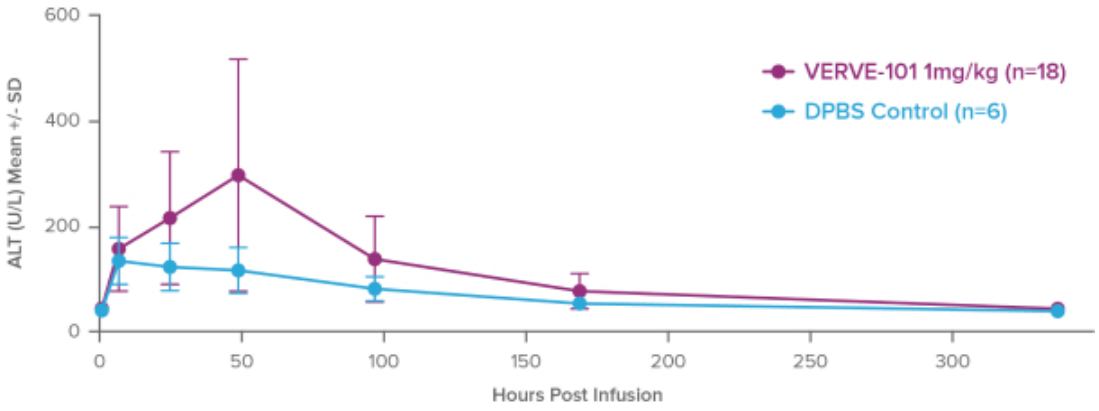
VERVE-101 biodistribution data

We are using an LNP-based approach to deliver VERVE-101 to the liver. An analysis of the biodistribution of VERVE-101 following administration of a single dose of 1 mg/kg in NHPs indicated that the large majority of editing occurred in the liver in a dose-dependent manner, with lesser rates of editing observed in the spleen and adrenal glands, as shown in the figure below. Other tissues examined showed editing of less than about 2%.



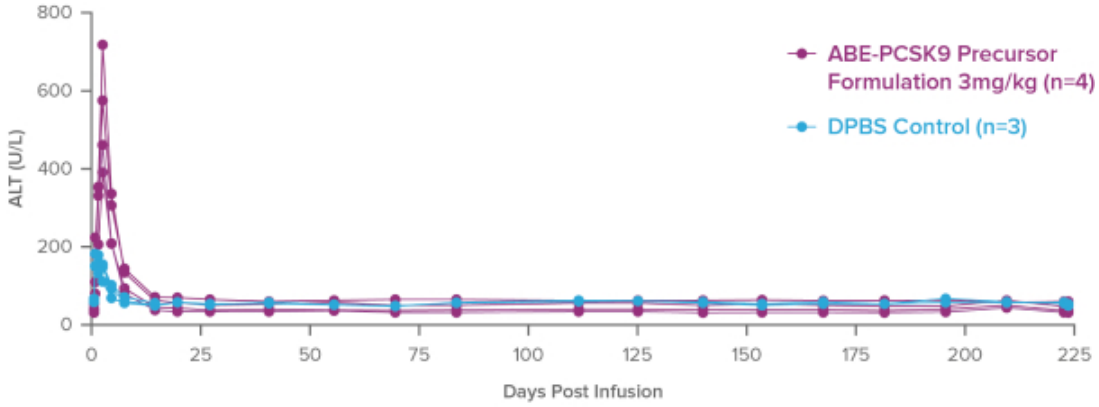
Tolerability of VERVE-101 in NHPs

VERVE-101 was generally well tolerated in NHP studies. We compared treatment with VERVE-101 to a control, or DPBS, at doses of 1 mg/kg or less and observed transient elevations of alanine aminotransferase, or ALT, consistent with mild acute liver injury within one to two days after dosing, which then peaked two to three days after dosing, with average values around 300 U/L following a 1 mg/kg dose. ALT is a commonly used blood marker of liver injury. Within one week of dosing, the average ALT value was within the normal range, indicating recovery, as shown in the figure below. These findings are consistent with observations from nonclinical studies performed for an approved LNP-based product that is administered intravenously.



The liver enzyme findings, which can be monitored with standard clinical laboratory testing, were consistently transient and mild in nature and fully normalized by one to two weeks. We believe that these findings compare favorably to viral vector delivery approaches, which can lead to unpredictable and acute liver injury.

In order to assess the long-term liver safety of VERVE-101, we monitored liver enzymes in a long-term durability study of an ABE-PCSK9 precursor formulation. As shown in the figure below, at eight months following administration, we did not observe evidence of any ongoing inflammation in the livers of NHPs that had undergone high levels of PCSK9 editing in the liver. In contrast, viral vector delivery can have subacute and chronic liver injury as a result of autoimmune reactions to the viral vector.



As LNPs are known to stimulate the immune system, we also assessed a panel of common cytokines following administration of a single dose of VERVE-101 in NHPs. At doses of 1 mg/kg or less, we observed mild and transient activation of certain cytokines, such as IP-10 or MCP-1, compared to control animals. This activation was apparent within 24 hours of dosing and fully resolved by the next observation point at one week. Other cytokines, including TNF-a, did not exhibit any changes above those seen in control animals.

We also assessed complement activation in NHPs that received single administration of VERVE-101. At doses of 1 mg/kg and less, we observed only minimal activation above that in control animals. This minimal activation was detectable approximately two hours after dosing but resolved by 24 hours.

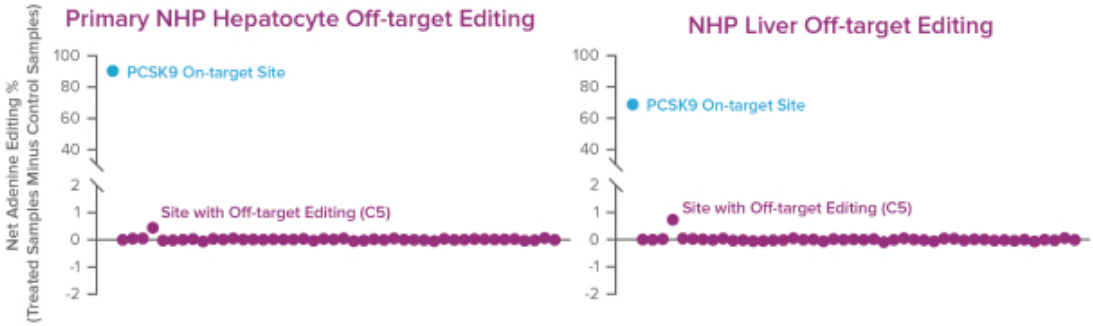
Preclinical off-target editing in NHP

While the human genome is the relevant genome to assess off-target editing, we believe that evaluations of off-target editing in NHPs can support the ability of off-target analysis in primary hepatocytes *in vitro* to predict off-target editing in the liver when dosed *in vivo*.

Our approach to the identification of potential off-target sites includes a combination of bioinformatic and *in vitro* biochemical techniques, including ABE-Digenome-seq and a new, state-of-the-art technique called ONE-seq. ONE-seq is a comprehensive and sensitive *in vitro* method to screen for and identify potential sequences where editing may occur. Using ONE-seq, we evaluated the 25,000 sequences in the NHP genome most closely matching the sequence of our on-target site. We prioritized 45 potential sites where editing may occur, of which the PCSK9 target site was identified as the top site.

We then used next-generation DNA sequencing to assess these sites for editing in primary NHP hepatocytes treated with VERVE-101. As shown in the figure below, besides editing at the PCSK9 target site, we did not observe off-target editing at any of the 44 potential off-target sites evaluated, depicted by the purple dots, except for one site designated C5. The C5 site is not present in the human genome.

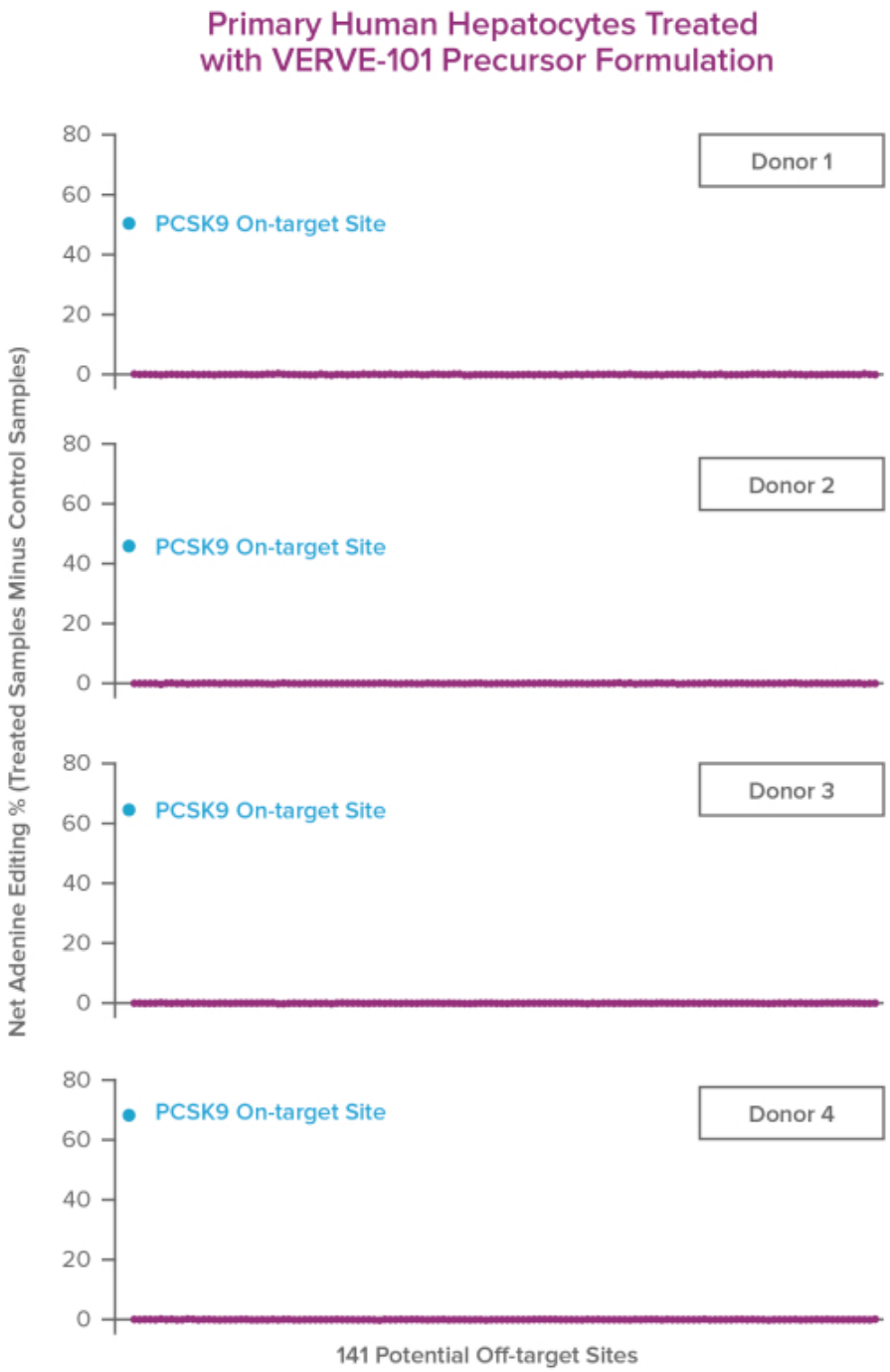
We then treated NHPs with VERVE-101, took NHP liver samples and sequenced the same sites that we evaluated in primary NHP hepatocytes. In NHP liver samples, we identified off-target editing only at the C5 site. These data support our belief that we have the ability to accurately predict off-target sites *in vivo* based on off-target analysis in primary hepatocytes *in vitro*.



Off-target analysis in primary human hepatocytes

Having established a methodology to connect off-target analysis in cells to *in vivo* editing, we turned to evaluation of the human genome for VERVE-101. Using the same ONE-seq methodology, we evaluated the 27,000 sequences in the reference human genome most closely matching the sequence of our on-target site. We prioritized 142 potential sites where editing may occur, of which the PCSK9 target site was the top site.

We next treated primary human hepatocytes from four donors with a VERVE-101 precursor and used next-generation DNA sequencing of PCR amplicons from the treated genomic DNA to assess the 142 sites for editing. As shown in the figure below, we did not observe editing at any of 141 potential off-target sites, depicted by the purple dots, when compared to control and observed only on-target editing at the PCSK9 target site.



In addition to the above analysis, we have evaluated for two other theoretical risks: editing of RNA by the base editor and translocations of DNA. In primary human hepatocytes, we did not observe any RNA editing above control or any translocations of DNA.

VERVE-101 next steps

We have had an initial regulatory interaction with the FDA via the INTERACT mechanism. We plan to have additional regulatory interactions, including a pre-IND meeting with the FDA in 2021. We have initiated IND-enabling studies for VERVE-101 and intend to submit an IND to the FDA and comparable foreign regulatory authorities in 2022, followed by initiation of clinical development for patients with HeFH.

Subject to discussion of the trial design with regulatory agencies, we expect that the patient population for the first-in-human, Phase 1 clinical trial of VERVE-101 will be approximately 25 to 30 adult patients with HeFH, including patients with an LDLR mutation, ASCVD and LDL that is not at goal on oral therapy. We expect the trial to have an open-label design and include three single-ascending dose cohorts with three to six patients per group as well as a dose-expansion cohort of 12 to 18 patients at a selected dose. Participants will be evaluated for safety and circulating PCSK9 protein and LDL-C levels at three months and at later time points. We expect that all participants will be subsequently enrolled into a long-term follow-up trial for up to 15 years to characterize the long-term safety and efficacy of VERVE-101.

ANGPTL3 program

Our second gene editing program is designed to permanently turn off the ANGPTL3 gene in the liver. ANGPTL3 is a key regulator of cholesterol and triglyceride metabolism. We plan to develop this program initially for the treatment of FH, including both homozygous familial hypercholesterolemia, or HoFH, which affects approximately 1,300 patients in the United States, as well as the more prevalent HeFH indication. Similar to our approach with VERVE-101, we plan to expand the clinical development of our ANGPTL3 program in a stepwise fashion beyond FH to patients with established ASCVD. Ultimately, we believe that our ANGPTL3 program may also be useful to people at risk for ASCVD as a preventative measure in the general population.

Our ANGPTL3 program is currently in the lead optimization stage. We expect that this program will utilize a GalNAc-modified LNP encapsulating an mRNA encoding an ABE and a gRNA targeting the ANGPTL3 gene.

ANGPTL3 as a target

The ANGPTL3 gene has recently emerged as a new and promising target for severe hyperlipidemia. The ANGPTL3 protein is produced almost exclusively in the liver and released into the blood. It was first identified as a regulator of cholesterol and triglyceride metabolism through genetic studies of a naturally occurring strain of mice with low cholesterol, low triglycerides and low circulating fatty acids. The main function of the ANGPTL3 protein is the inhibition of lipoprotein lipase, an enzyme on the surface of blood vessels in the heart, skeletal muscle and fat that is responsible for the breakdown and clearance of circulating triglycerides. ANGPTL3 protein has also been shown to regulate LDL-C by a mechanism that does not depend on LDLR expression, which is in contrast to the mechanism by which PCSK9 regulates LDL-C.

Human genetic studies, conducted by our founders, determined that naturally occurring loss-of-function mutations in the ANGPTL3 gene result in extremely low levels of triglycerides, LDL-C and high-density lipoprotein cholesterol, or HDL-C. Subsequent studies determined that there were no apparent adverse health consequences observed in patients who naturally lack ANGPTL3 function. Furthermore, individuals completely lacking ANGTPL3 gene function were free from coronary atherosclerotic plaques evaluated by coronary computerized tomography, or CT, scan, compared to matched control family members. Two independent population genetic studies of individuals carrying a single mutated copy of ANGPTL3 demonstrated that partial loss of ANGPTL3 function is protective against ASCVD, with a 34% and 41% lower risk, respectively, compared to individuals without any ANGPTL3 mutations. Collectively, these studies provided strong evidence for ANGPTL3 as a potential therapeutic target for hyperlipidemia and ASCVD risk reduction.

Multiple therapeutic approaches targeting ANGPTL3 have been developed or are being evaluated in the clinic and provide further validation for ANGPTL3 as a target. Evinacumab is a mAb targeting ANGPTL3 that has been

shown to effectively lower LDL-C and triglycerides in patients with HoFH and HeFH. The Phase 3 trial for evinacumab in patients with HoFH demonstrated a 49% reduction of LDL-C and a 50% reduction of triglycerides after 24 weeks compared to placebo. Based on these data, evinacumab was approved by the FDA in 2021 for the treatment of patients with HoFH.

The LDL-C lowering effect of evinacumab has been demonstrated to be additive to that of PCSK9 inhibition. In a late-stage clinical trial of patients with refractory hypercholesterolemia, due to HeFH in the majority of cases, the addition of evinacumab to a PCSK9 inhibitor further reduced LDL-C by 56% compared to placebo. In addition, other investigational agents targeting ANGPTL3 are being evaluated in patients with severe hypertriglyceridemia, including vupanorsen, an antisense oligonucleotide therapy targeting ANGPTL3, and ARO-ANG3, a siRNA targeting ANGPTL3.

Preclinical studies

We are evaluating multiple LNP formulations with a view to enabling treatment of patients with all forms of FH, as well as multiple editor and gRNA options. In preclinical data generated to date, and discussed below, we have observed the following:

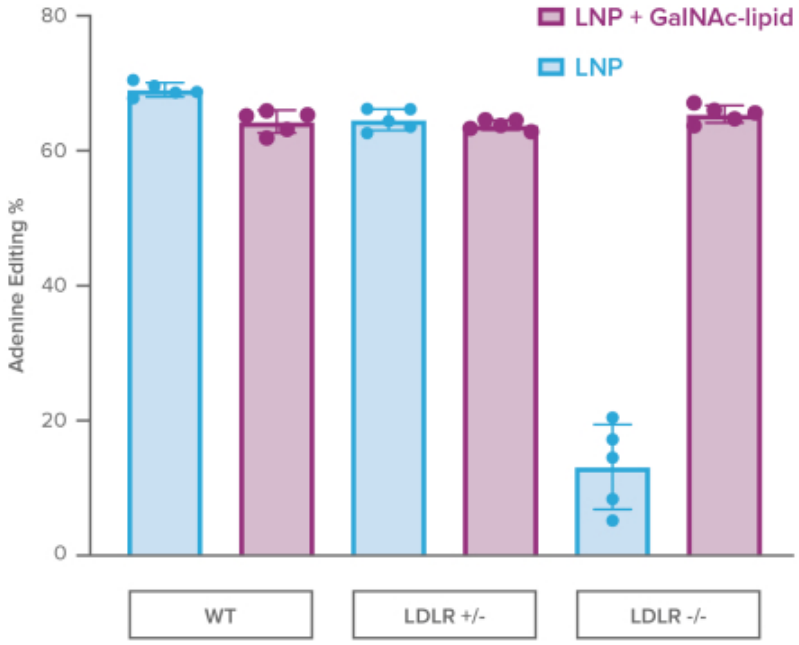
- development of a proprietary GalNAc-targeting ligand that when added to an LNP is capable of delivering a base editor to the liver independent of the LDL receptor status in mice, and which may potentially be used to treat patients with HeFH and HoFH;
- proof-of-concept data in NHPs for an ABE-ANGPTL3 precursor formulation demonstrating 60% whole liver editing, 95% reduction in ANGPTL3 and 64% reduction in triglycerides at two weeks after a single treatment; and
- durability data in NHPs for an ABE-ANGPTL3 precursor formulation demonstrating an ANGPTL3 reduction of 96% and triglyceride reduction of 69% seen at ten months following a single treatment.

Discovery and validation of LNPs

LNP-mediated delivery to the liver is more challenging in patients with HoFH than in those with HeFH. This is due to the fact that deficiency in the LDLR gene often drives HoFH pathophysiology, and uptake of LNPs into the liver is generally thought to be through a predominantly LDLR-dependent pathway. An approach to bypass the LDLR would be the addition of a targeting ligand to LNPs that works through a receptor other than LDLR.

We have screened and developed a proprietary GalNAc-targeting ligand that can be incorporated into LNPs. GalNAc ligands bind to the asialoglycoprotein receptors, or ASGPR, in the liver and have been used to enhance delivery of siRNAs to the liver. ASGPR is highly expressed in the liver with rapid turnover in about 15 minutes and high capacity to mediate uptake into the liver independent of LDLR.

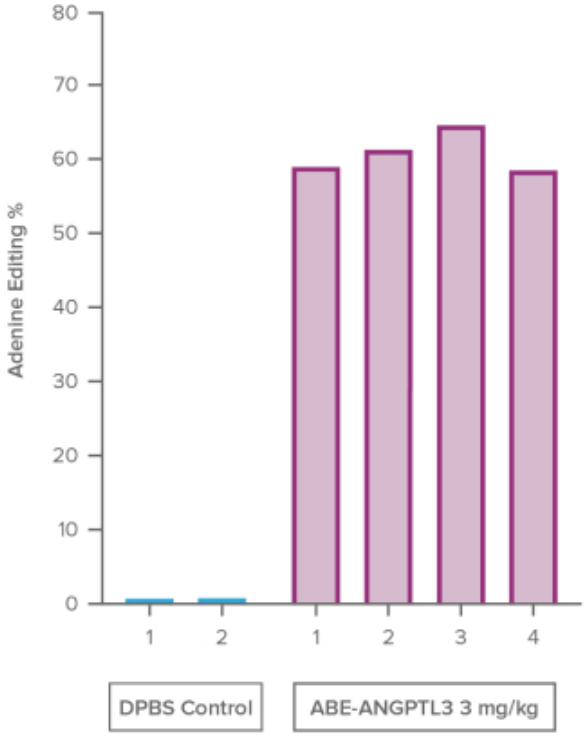
We conducted a preclinical study in mice that were entirely deficient in the LDL receptor, or LDLR -/- mice, in order to evaluate the efficacy of our proprietary GalNAc-targeted LNPs. As shown in the graphic below, the addition of the GalNAc ligand onto the LNP increased editing in the liver of LDLR -/- mice. We observed that GalNAc-targeted LNPs have similar apparent potency in wild-type, LDLR +/- mice and LDLR -/- mice.



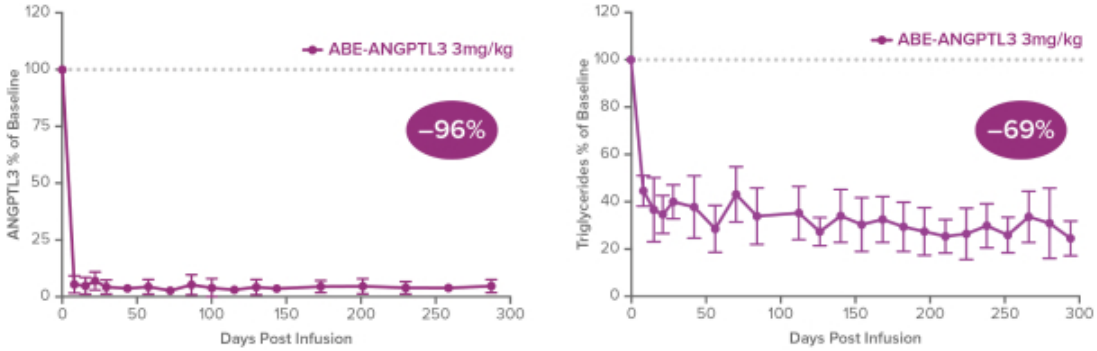
We are continuing to invest and build out capabilities in the development of novel and optimized GalNAc-targeting ligands, optimal lipid anchors, optimal compositions and ratios of LNP components, and optimal processes of addition and LNP formation with targeting ligands. We believe GalNAc provides a delivery platform for patients with both forms of FH and potentially may be applicable in other applications where liver-directed delivery is advantageous.

NHP validation with ABE-ANGPTL3 precursor formulation

We conducted a preclinical proof-of-concept study using an ABE-ANGPTL3 precursor formulation. In this study, which is ongoing, we administered a single dose to healthy NHPs. In the figure below, each treated NHP is represented by a purple bar and each vehicle treated control is represented by a blue bar. Following a single treatment with our ABE-ANGPTL3 precursor formulation, we observed an average 60% editing of ANGPTL3 in whole liver tissue sampled through a liver biopsy two weeks after dosing. This was accompanied by an average 95% reduction of blood ANGPTL3 protein and an average 64% reduction of blood triglycerides concentrations.



Importantly, in this preclinical study, we observed that the reductions in blood ANGPTL3 protein and blood triglycerides levels were durably maintained. As shown in the figure below, at ten months following a single intravenous administration of ABE-ANGPTL3, we observed that the NHPs continued to exhibit an average reduction of 96% in blood ANGPTL3 protein and an average reduction of 69% in blood triglycerides.



ANGPTL3 program next steps

We are currently conducting additional mouse and NHP preclinical studies as we optimize the gRNA, editor and LNP delivery, including GalNAc modifications, for our ANGPTL3 program. We plan to nominate a lead development candidate and initiate IND-enabling studies in 2022.

Future opportunities

We are investing in the identification of new product candidates within the liver-cardiovascular axis. We are exploring additional targets in two categories: lipoprotein targets for the treatment of ASCVD and other liver-cardiovascular targets for cardiomyopathy, thrombotic disorders or cardiometabolic disorders. We plan to continue to focus on programs where the target has biology substantially validated by human genetics and, in many cases, by clinical development programs using other modalities.

Manufacturing

We do not currently own or operate manufacturing facilities. We currently rely on third-party contract manufacturing organizations, or CMOs, and suppliers for critical starting materials, drug substances—gRNA, mRNA—and our drug products. We plan to use third-party CMOs to support our IND-enabling studies and to fully supply our clinical trials and commercial activities. As we scale manufacturing, we intend to continue to expand and strengthen our network of CMOs. We believe there are multiple sources for all of the materials required for the manufacture of our product candidates, as well as multiple CMOs who could assemble the components of our program candidates. For VERVE-101, we have purchased and stockpiled critical raw materials and completed a tech transfer of drug substance and drug product.

Manufacturing is subject to extensive regulations that impose procedural and documentation requirements. These regulations govern record keeping, manufacturing processes and controls, personnel, quality control and quality assurance. Our CMOs are required to comply with these regulations and are assessed by regular monitoring and formal audits. Our third-party manufacturers are required to manufacture any product candidates we develop under current Good Manufacturing Practice, or cGMP, requirements and other applicable laws and regulations.

We have personnel with extensive technical, manufacturing, analytical and quality experience to oversee our contracted manufacturing and testing activities.

Competition

The biotechnology and biopharmaceutical industries generally, and the CVD field specifically, are characterized by rapid evolution of technologies, sharp competition and strong defense of intellectual property. Any product candidates that we successfully develop and commercialize will have to compete with existing therapies and new therapies that may become available in the future. While we believe that our technology, development experience and scientific knowledge in CVD, gene editing and manufacturing provide us with competitive advantages, we face potential competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions, governmental agencies and public and private research institutions.

Many of the companies against which we are competing or against which we may compete in the future 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 industry 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 programs.

The key competitive factors affecting the success of all of our product candidates that we develop for the treatment of CVD if approved, are likely to be efficacy, safety, convenience, price, the level of generic competition and the availability of reimbursement from government and other third-party payors.

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. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. In addition, our ability to compete may be affected in many cases by insurers or other third-party payors seeking to encourage the use of generic products. If our product candidates achieve marketing approval, we expect that they will be priced at a significant premium to competitive generic products.

There are several approved products for LDL-C lowering or cardiovascular risk reduction, such as statins, ezetimibe, bempedoic acid, lomitapide, mipomersen and icosapent ethyl. There are several approved products that target PCSK9 protein as a mechanism to lower LDL-C and reduce the risk of ASCVD. Evolocumab, which is a mAb marketed as Repatha® by Amgen Inc., is approved by the FDA for the treatment of patients with HeFH, patients with HoFH and patients with ASCVD. Alirocumab, which is a mAb marketed as PRALUENT® by both Sanofi and Regeneron Pharmaceuticals, Inc., is approved by the FDA for the treatment of patients with ASCVD and for the treatment of patients with primary hyperlipidemia, including HeFH. The approved mAb treatments act through extracellular inhibition of the PCSK9 protein. Inclisiran, which is a siRNA marketed as Leqvio® by Novartis, is approved in Europe for the treatment of patients with hypercholesterolemia, including HeFH, or mixed dyslipidemia. Inclisiran acts by inhibiting the synthesis of PCSK9 within liver cells, which is distinct from extracellular protein inhibition. We are also aware of several product candidates in clinical development that target PCSK9 protein as a mechanism to lower LDL-C and reduce the risk of ASCVD, including an oral small molecule PCSK9 inhibitor from Serometrix LLC in-licensed by Esperion Therapeutics, Inc. for which they plan to submit an IND in 2021.

We are aware of one other gene editing program targeting the PCSK9 gene in preclinical development. Precision Biosciences, Inc. has published preclinical data showing long-term stable reduction of LDL-C levels in NHPs following *in vivo* gene editing of the PCSK9 gene using its gene editing platform.

Evinacumab, which is a mAb targeting ANGPTL3 protein that is marketed by Regeneron Pharmaceuticals, Inc., is approved by the FDA for the treatment of patients with HoFH and being evaluated in Phase 2 development for severe hypertriglyceridemia. We are aware of several product candidates in clinical development that target ANGPTL3 as a mechanism to lower LDL-C and reduce the risk of ASCVD, including vupanorsen, an antisense oligonucleotide therapy in a Phase 2 clinical trial by Ionis Pharmaceuticals and Pfizer Inc. for the treatment of patients with elevated non-HDL-C and triglycerides. In addition, ARO-ANG3, a siRNA targeting ANGPTL3, is being evaluated in a Phase 1/2 clinical trial by Arrowhead Pharmaceuticals, with an IND filed for a Phase 2 trial of ARO-ANG3 for the treatment of patients with mixed dyslipidemia.

Intellectual property

We strive to protect the proprietary technologies that we believe are important to our business, including pursuing and maintaining patent protection intended to cover the composition of matter of our product candidates, their methods of use, related technologies and other inventions that are important to our business. In addition to patent protection, we also rely on trade secrets to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection, including certain aspects of our technology.

Our commercial success depends in part upon our ability to obtain and maintain patent and other proprietary protection for commercially important technologies, inventions and know how related to our business, defend and enforce our intellectual property rights, in particular, our patent rights, preserve the confidentiality of our trade secrets and operate without infringing valid and enforceable intellectual property rights of others.

The patent positions for biotechnology and pharmaceutical companies like ours are generally uncertain and can involve complex legal, scientific and factual issues. In addition, the coverage claimed in a patent application can be significantly reduced before a patent is issued, and its scope can be reinterpreted and even challenged after issuance. As a result, we cannot guarantee that any of our product candidates will be protected or remain protectable by enforceable patents. We cannot predict whether the patent applications we are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient proprietary protection from competitors. Any patents that we hold may be challenged, circumvented or invalidated by third parties.

As of May 31, 2021, our solely owned patent estate included one pending U.S. non-provisional patent application, seven pending U.S. provisional applications, and five international PCT applications pending.

Our owned and licensed patent estate covers various aspects of our programs and technology, including our gene editing programs for PCSK9 and ANGPTL3 targets as well as our RNA delivery and other platform technology. Any U.S. or foreign patents issued from national stage filings of our PCT patent applications and any U.S. patents issued from non-provisional applications we may file in connection with our provisional patent applications would be scheduled to expire on various dates from 2041 through 2042, without taking into account any possible patent term adjustments or extensions and assuming payment of all appropriate maintenance, renewal, annuity and other governmental fees. Further details on certain segments of our patent portfolio are included below.

PCSK9 program

With regard to our VERVE-101 program, as of May 31, 2021, we solely own one pending international PCT patent application and two pending U.S. provisional patent applications, which, if issued, are expected to expire between 2041 to 2042, without taking potential patent term extensions into account. Our patent applications cover various aspects of our VERVE-101 program, including guide RNA sequences targeting the PCSK9 gene, mRNAs encoding adenine base editors, and compositions thereof, methods of using such compositions for therapeutic indications, methods for *in vivo* gene editing, formulations, dosing regimens, and combination therapies.

ANGPTL3 program

With regard to our ANGPTL3 program, as of May 31, 2021, we solely own one pending international PCT patent application and one pending U.S. provisional patent application, which, if issued, are expected to expire in 2041, without taking potential patent term extensions into account. Our patent applications cover various aspects of our ANGPTL3 program, including guide RNA sequences targeting the ANGPTL3 gene, mRNAs encoding adenine base editors, and compositions thereof, methods of using such compositions for therapeutic indications, methods for *in vivo* gene editing, formulations, dosing regimens, and combination therapies.

License and collaboration agreements

We are a party to a number of license agreements under which we license patents, patent applications and other intellectual property from third parties. The licensed intellectual property covers, in part, CRISPR-related compositions of matter and their use for base editing. These licenses impose various diligence and financial payment obligations on us. We expect to continue to enter into these types of license agreements in the future. We consider the following license agreements to be material to our business.

Collaboration and license agreement with Beam Therapeutics

In April 2019, we entered into a collaboration and license agreement with Beam, or the Beam Agreement, pursuant to which we received an exclusive, worldwide, sublicensable license under certain of Beam's base editing technology, as well as gene editing and delivery technologies to develop, make, use, offer for sale, sell and import base editing products and nuclease products using Beam's CRISPR associated protein 12b, or Cas12b technology, in each case, directed to any of four gene targets, including the PCSK9 and ANGPTL3 genes, that are associated with an increased risk of coronary diseases, or the licensed products. Upon execution of the Beam Agreement and as partial consideration for the rights granted to us thereunder, we issued 276,075 shares of our common stock to Beam.

In addition, we granted Beam a non-exclusive license under know-how and patents controlled by us, and an interest in joint collaboration technology, to allow Beam to conduct activities under agreed upon research and development plans, as applicable, under the Beam Agreement. We further granted Beam an exclusive, worldwide, sublicensable license under certain of our delivery technology relating to our know-how and patent rights solely to the extent such rights claim, embody or incorporate a delivery system or component thereof that can be used for the delivery of base editor product to human genome targets, to allow Beam to develop, make, use, offer for sale, sell, and import product candidates and products, except for base editor products.

We and Beam each have the right to sublicense our licensed rights, subject to certain restrictions and provided that the sublicense agreement is in compliance and consistent with the terms of the Beam Agreement and any applicable in-licensed agreements.

Following the final dosing of a patient in a Phase 1 clinical trial of a given licensed product, Beam has the right to opt in to share 33% of worldwide expenses of the development of such licensed product, as well as jointly commercialize and share profits and expenses of commercializing such licensed product in the United States on a 50/50 basis. If Beam exercises its opt-in right for a given licensed product, which we refer to following such opt-in as a collaboration product, it will be obligated to pay for a specified percentage of the development and commercialization costs of such collaboration product and will have the right to receive a specified percentage of the profits from any sales of such collaboration product. With respect to each collaboration product, we and Beam will enter into a subsequent co-promotion agreement prior to the anticipated sale of such collaboration product in the United States, pursuant to which we and Beam will each provide 50% of the promotional effort required to promote the collaboration product.

Except as described in the foregoing, we are fully responsible for the development of licensed products under the Beam Agreement.

For collaboration products, on a product-by-product basis outside of the United States, we are obligated to pay clinical and regulatory milestones of up to an aggregate of $5.6 million and sales-based milestones of up to an aggregate of $7.5 million. For non-collaboration products, on a product-by-product basis worldwide, we are obligated to pay clinical and regulatory milestones of up to an aggregate of $11.3 million and sales-based milestones of up to an aggregate of $15.0 million.

To the extent there are sales of a collaboration product outside of the United States or a non-collaboration product worldwide, we will be required to pay tiered royalties to Beam at rates ranging from the low-to-mid single digit percentage of net sales, subject to specified reductions. Such royalty payments will terminate on a country-by-country and product-by-product basis upon the later to occur of (i) the expiration of the last to expire valid claim under the patent rights covering such product in such country, (ii) the period of regulatory exclusivity associated with such product in such country or (iii) 10 years after the first commercial sale of such product in such country.

In further consideration for the licenses granted under each of our and Beam's respective delivery technologies, we or Beam will pay to the other party development-based milestone payments of up to $6.0 million for each delivery technology product of such paying party to achieve the corresponding milestone event. To the extent there are sales of a delivery technology product, we or Beam will pay the other party low-to-mid single digit royalties based on the annual aggregate worldwide net sales resulting from the sale of each delivery technology product of such paying party on a delivery technology product-by-delivery technology product basis; provided however that such royalty payments will not apply to net sales of the collaboration products or licensed products. Such royalty payments will terminate on a country-by-country and delivery technology product-by-delivery technology product basis upon the later to occur of (i) the expiration of the last to expire valid claim under the patent rights covering such delivery technology product in such country, (ii) the period of regulatory exclusivity associated with such delivery technology in such country or (iii) 10 years after the first commercial sale of such delivery technology product in such country.

Beam retains control of the prosecution of its respective patent rights, at its sole expense. We have the first right, but not the obligation, to file for, and prosecute and enforce, at our sole expense, product-specific patent rights under the Beam Agreement, to the extent permitted by Beam's applicable in-license agreements, and we have the exclusive right to file for, prosecute and maintain the patent rights under our delivery technology and any other patent rights that we licensed to Beam under the Beam Agreement.

With respect to intellectual property rights jointly developed by Beam and Verve arising out of a party's performance of its obligations under the agreement, such intellectual property, depending on its nature, is considered under the agreement as joint collaboration technology and subject to joint ownership by Beam and Verve and we and Beam shall decide in good faith as to who shall bear responsibility for filing for, prosecuting and maintaining the jointly owned patent rights.

The term of the Beam Agreement continues until the last to expire of any royalty term for any licensed product. We have the right to terminate the Beam Agreement as to any licensed product, but not for any collaboration product, by delivering a 90-day termination notice to Beam, provided that Beam has elected not to exercise its opt-in right or the period to exercise such opt-in right has expired. The Beam Agreement may be terminated by either party upon (i) written notice if the other party is in material breach and fails to cure such breach within the specified cure period or (ii) the other party's bankruptcy or liquidation. Beam may terminate the Beam Agreement, and we may terminate the licenses granted to Beam under the Beam Agreement, immediately if the other party, directly or indirectly, challenges the enforceability, validity or scope of any patent rights underlying the licenses granted under the Beam Agreement.

Acuitas agreements

Development and option agreement

In December 2019, we entered into a development and option agreement with Acuitas, which agreement we amended and restated in October 2020, or the Acuitas Development Agreement, pursuant to which Acuitas granted us a non-exclusive, worldwide, royalty-free license under its LNP technology. The Acuitas Development Agreement provides us the option to enter into separate non-exclusive license agreements for a specified number of targets under which we can pursue further development and commercialization of licensed products that include the Acuitas LNP technology. Under the Acuitas Development Agreement, we paid Acuitas an upfront technology access fee of $0.5 million and we are obligated to pay annual maintenance fees of $0.3 million for each target and annual target reservation fees of $0.1 million per target to Acuitas. Upon exercising an option to enter into a non-exclusive license agreement for any gene target, we are required to pay Acuitas $2.0 million less any amounts from the target reservation and maintenance fees that are creditable against the option exercise fee.

The collaboration is supervised by a joint development committee that oversees, reviews and manages the development plan with respect to LNPs developed and optimized under the collaboration. With respect to the patent rights underlying each license, we and Acuitas separately retain control of the prosecution of our respective in-licensed patent rights. With respect to any intellectual property rights resulting from the collaboration, other than improvements to each parties' solely owned intellectual property, we and Acuitas each have a one-half interest in the intellectual property rights and jointly maintain and prosecute such intellectual property rights.

The Acuitas Development Agreement will terminate in December 2022, provided that we have the option to extend the term for an additional two years upon prior written notice. We may terminate the Acuitas Development Agreement without cause upon prior written notice to Acuitas. Either party may terminate the Acuitas Development Agreement upon (i) written notice if the other party is in material breach and fails to cure such breach within the specified cure period or (ii) immediately upon notice in the event of the other party's bankruptcy or insolvency.

License agreement for the PCSK9 gene target

In October 2020, we selected an LNP optimized under the Acuitas Development Agreement to be a component of our VERVE-101 product candidate. In connection with that selection, we exercised an option with respect to the use of the LNP technology and entered into a non-exclusive, worldwide license with Acuitas, or the Acuitas License Agreement, with a right to sub-license through multiple tiers, under the licensed LNP technology to research, develop, have developed, make, have made, keep, use and have used, sell, offer for sale, have sold, import and have imported, export and have exported and otherwise commercialize and exploit licensed products using the LNP technology in connection with the PCSK9 gene target for all human therapeutic or prophylactic uses. Under the Acuitas License Agreement, we are obligated to use diligent efforts to develop and commercialize licensed products.

Acuitas retained the right to prosecute and maintain, at its sole expense, patents related to the LNP technology. In the event that Acuitas elects not to file, prosecute or maintain patents related to the LNP technology, it will notify us and we have the right, but not the obligation, to request that Acuitas continue to file, prosecute or maintain such patents, at our expense, and our license to such patents will automatically become irrevocable, perpetual, fully paid-up and royalty free, but such patents will thereafter no longer be part of the licensed technology in such country.

We and Acuitas will enter into a joint patent prosecution and maintenance agreement with respect to the jointly owned patents under the Acuitas License Agreement and as further provided in the Acuitas Development Agreement.

We paid Acuitas an upfront license fee of $2.0 million (less previously paid target reservation fees) and are required to pay an annual license maintenance fee of $0.8 million until the achievement of a certain development-based milestone. We are also obligated to reimburse Acuitas quarterly for employee and reasonable external expenses incurred that are related to the transfer of its licensed technology to our CMO.

We are also obligated to pay Acuitas up to an aggregate of $9.8 million in clinical and regulatory milestones and $9.5 million in sales-based milestones. We will be required to pay royalties at a low single digit percentage based on annual net sales of licensed products sold by us, our affiliates or our sublicensees. Such royalty payments are subject to reduction if we obtain a license from a third party under technology relating to the LNP technology. Any such royalty payments are payable, on a country-by-country and licensed product-by-licensed product basis, until the later of (i) the expiration of the last to expire valid claim in the licensed technology that covers the licensed product in such country, (ii) the expiration of the regulatory exclusivity period in such country and (iii) ten years from the first commercial sale of the licensed product in such country.

The Acuitas License Agreement will terminate on a licensed product-by-licensed product and country-by-country basis upon the last-to-expire royalty term in such country with respect to such licensed product. We may terminate the Acuitas License Agreement without cause upon prior written notice to Acuitas. Either party may terminate the Acuitas License Agreement upon (i) written notice if the other party is in material breach and fails to cure such breach within the specified cure period or (ii) immediately upon notice in the event of the other party's bankruptcy or insolvency. In lieu of terminating the agreement for Acuitas' uncured material breach, we have the alternative option, upon written notice to Acuitas, not to terminate the agreement but instead reduce the applicable milestone and royalty payments by a specified percentage.

Cas9 license agreement with The Broad Institute and the President and Fellows of Harvard College

In March 2019, we entered into a license agreement with Broad and Harvard for specified patent rights and in December 2019, we entered into an amendment to this license agreement, or, as amended, the Cas9 License Agreement. The licenses granted to us under the Cas9 License Agreement include rights to (i) certain patents and patent applications solely owned by Harvard, or the Harvard Cas9-I Patent Rights, certain patents and patent applications co-owned by the Massachusetts Institute of Technology, or MIT, and Broad, certain patents and patent applications co-owned by The Rockefeller University, or Rockefeller, and Broad, and certain patents and patent applications co-owned by MIT, Broad and Harvard, which patents and patent applications licensed under the Cas9 License Agreement we refer to as the Harvard/Broad Cas9-I Patent Rights and (ii) certain patents and patent applications co-owned by MIT, Broad, Harvard and the University of Iowa Research Foundation, or Iowa, which patents and patent applications licensed under the Cas9 License Agreement we refer to as the Harvard/Broad Cas9-II Patent Rights, and together with the Harvard/Broad Cas9-I Patent Rights, the Harvard/Broad Cas9 Patent Rights.

In February 2017, Broad and Rockefeller entered into an inter-institutional agreement pursuant to which Rockefeller authorized Broad to act as its sole and exclusive agent for the purposes of licensing Rockefeller's rights in such Harvard/Broad Cas9-I Patent Rights.

In December 2014, as amended in August 2016, MIT, Iowa and Broad entered into a joint invention administration agreement pursuant to which Iowa authorized Broad to act as their sole and exclusive agent for the purposes of licensing their rights in such Harvard/Broad Cas9-II Patent Rights.

License rights under Cas9 License Agreement

Pursuant to the Cas9 License Agreement, Broad and Harvard granted us a worldwide, royalty-bearing, sublicensable license to the Harvard/Broad Cas9 Patent Rights to make, have made, use, have used, sell, offer for sale, have sold, import and export products directed to PCSK9, ANGPTL3 and two additional targets, in the field of the prevention and treatment of human disease, subject to certain limitations and retained rights. With respect to the Harvard/Broad Cas9-I Patent Rights and certain of the Harvard/Broad Cas9-II Patent Rights, or the Cas 9-II Group A Patent Rights, the license is co-exclusive with Editas Medicine, Inc., or Editas. With respect to certain other of the Harvard/Broad Cas9-II Patent Rights, or the Cas9-II Group B Patent Rights, the license is non-exclusive. The license follows the inclusive innovation strategy developed by Broad, MIT and Harvard.

Broad and Harvard also granted us a non-exclusive, worldwide, royalty-bearing, sublicensable license to the Harvard/Broad Cas9 Patent Rights for internal research purposes; for research, development and commercialization of products for the prevention or treatment of human disease outside the field of Editas' exclusive license agreements with Broad and Harvard; and with respect to the targets, to make, have made, use, have used, sell, offer for sale, have sold, import and export products that are not Cas9 licensed products but is a Cas9 enabled products.

The licenses granted by Broad and Harvard to us under the Cas9 License Agreement are subject to retained rights of the U.S. government in the Harvard/Broad Cas9 Patent Rights and the rights retained by Broad, Harvard, MIT, Rockefeller and Iowa on behalf of themselves and other academic, government and non-profit entities, to practice the Harvard/Broad Cas9 Patent Rights, as applicable, for research, educational or teaching purposes. In addition, certain rights granted to us under the Cas9 License Agreement for the Harvard/Broad Cas9-I Patent Rights are further subject to a non-exclusive license to the Howard Hughes Medical Institute for research purposes. Our co-exclusive license rights also are subject to rights retained by Broad, Harvard, MIT, Rockefeller and Iowa, for each of them and for any third party (including non-profit and for-profit entities), to research, develop, make, have made, use, offer for sale, sell, have sold, import or otherwise exploit the Harvard/Broad Cas9 Patent Rights and licensed products as research products or research tools, or for research purposes.

We have the right to sublicense our licensed rights, subject to certain restrictions and provided that the sublicense agreement must be in compliance and consistent with the terms of the Cas9 License Agreement. Any sublicense agreement cannot include the right to assign sublicenses without the written consent of Broad and Harvard. In addition, any sublicense agreements must contain certain terms, including a provision requiring the sublicensee to indemnify Harvard, Broad, MIT, Rockefeller, Iowa and Howard Hughes Medical Institute according to the same terms as are provided in the Cas9 License Agreement and a statement that Broad, Harvard, MIT, Rockefeller, Iowa and Howard Hughes Medical Institute are intended third-party beneficiaries of the sublicense agreement for certain purposes.

We are obligated to use commercially reasonable efforts, or to cause at least one of our affiliates or sublicensees to use commercially reasonable efforts, (i) to research and develop Cas9 licensed products in the licensed field, (ii) to introduce such products in the licensed field into the commercial market, and (iii) to market such products in the licensed field following such introduction into the market and make such products reasonably available to the public. In addition, we, by ourselves or through any of our affiliates or sublicensees, are obligated to achieve certain development milestones within certain time periods. Broad and Harvard have the right to terminate the Cas9 License Agreement if we fail to achieve a development milestone, subject to our right to extend or amend such milestone in accordance with certain procedures. Such termination right will not apply solely with respect to a particular target if, at the time Broad and Harvard elect to terminate the Cas9 License Agreement for failure to achieve a development milestone, we provide evidence reasonably acceptable to Harvard and Broad that we are not in breach of our development milestone diligence obligations with respect to such target and that we are, or one of our affiliates or sublicensees are, (a) researching and developing Cas9 licensed products in the licensed field directed to such target, (b) using commercially reasonable efforts to introduce Cas9 licensed products in the licensed field directed to such target into the commercial market (if applicable), and (c) using commercially reasonable efforts to market Cas9 licensed products in the licensed field directed to such target following such introduction into the market and make such Cas9 licensed products reasonably available to the public (if applicable), and thereafter, for the remainder of the term, we continue, or cause at least one of our affiliates or sublicensees to continue, to develop and commercialize Cas9 licensed products directed to such target in accordance with the foregoing (a)-(c).

Under the Cas9 License Agreement, Broad and Harvard also retained rights to grant further licenses, through its inclusive innovation strategy, under specified circumstances, to third parties, other than specified entities, that wish to develop and commercialize products that target a particular gene outside of the cardiovascular disease field and that otherwise would fall within the scope of our co-exclusive license from Broad and Harvard. If a third party requests a license under the Harvard/Broad Cas9-I Patent Rights for the development and commercialization of a product that would be subject to our co-exclusive license grant from Broad and Harvard under the Cas9 License Agreement, Broad and Harvard may notify us of the request, which we refer to as the Cas9 Third Party Proposed Product Requests. A Cas9 Third Party Proposed Product Request must be

accompanied by the third party's bona fide proposal, including the proposed target or category. Broad may not grant a Cas9 Third Party Proposed Product Request (i) if we, directly or indirectly through any of our affiliates or sublicensees, are researching, developing or commercializing a product directed to the same gene target that is the subject of the Cas9 Third Party Proposed Product Request, or the Cas9 Licensee Product, and we can demonstrate such ongoing efforts to Broad's reasonable satisfaction, or (ii) if we, directly or indirectly through any of our affiliates or sublicensees, wish to do so, and we can demonstrate to Broad's reasonable satisfaction that we are interested in researching, developing and commercializing a Cas9 Licensee Product, that we have a commercially reasonable research, development and commercialization plan to do so, and we commence and continue reasonable commercial efforts under such plan. Furthermore, if we, directly or indirectly through any of our affiliates or sublicensees, are not researching, developing or commercializing a Cas9 Licensee Product but wish to grant a sublicense to do so, Broad is obligated to disclose to us the name of the third party and we may enter into a sublicense agreement with the third party. If we, directly or indirectly through any of our affiliates or sublicensees, are not researching, developing or commercializing a Cas9 Licensee Product, are unable to develop and implement a plan reasonably satisfactory to Broad and Harvard, or are unable to enter into a sublicense agreement with the third party, Broad and Harvard have the right to terminate our rights to the specified third-party target or to a specified category and have the right to freely grant to third parties licenses in the licensed field (a) under the patent rights that are exclusively or co-exclusively licensed to us with respect to such specified third party target or (b) under the patent rights that are exclusively or co-exclusively licensed to us within such specified category, provided that such licenses do not grant rights to commercialize products intended for use in the cardiovascular disease field.

Payment terms

Under the Cas9 License Agreement, we paid Broad and Harvard an upfront license fee of $0.1 million and issued an aggregate of 138,037 shares of our common stock to Broad and Harvard. Broad and Harvard also have anti-dilution rights, pursuant to which we (i) have issued Broad and Harvard an aggregate of an additional 309,278 shares of our common stock in the aggregate following the completion of preferred stock financings and (ii) will issue to Broad and Harvard an aggregate of an additional 878,098 shares of common stock upon the closing of this offering, based on our issuance and sale of 14,035,789 shares of our common stock in this offering. See "Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College—Issuance of shares in a private placement in connection with this offering."

We also must pay an annual license maintenance fee ranging in dollars from the low- to mid-five figures, depending on the calendar year. A portion of this annual license maintenance fee is creditable against royalties owed on licensed or enabled products in the same year as the maintenance fee is paid.

Broad and Harvard, collectively, are entitled to receive (i) clinical and regulatory milestone payments of up to an aggregate of $5.7 million per licensed product in the United States, the European Union and Japan for the prevention or treatment of a human disease that afflicts fewer than a certain number of patients in the United States and (ii) clinical and regulatory milestone payments of up to an aggregate of $17.4 million per licensed product in the United States, the European Union and Japan for the prevention or treatment of a human disease that afflicts at least a certain number of patients in the United States. If we undergo a change of control during the term of the Cas9 License Agreement, certain of these clinical and regulatory milestone payments will increase by a certain percentage. We are also obligated to make additional payments to Broad and Harvard, collectively, of up to an aggregate of $54.0 million upon the occurrence of certain sales-based milestones per licensed product.

We are also obligated to pay to Broad and Harvard tiered success payments in the event our average market capitalization exceeds specified thresholds ascending from a high nine digit dollar amount to $10.0 billion, or

the Market Cap Success Payments, or sale of our company for consideration in excess of those thresholds, or the Company Sale Success Payments, which with the Market Cap Success Payments, we refer to as the Success Payments. Market Cap Success Payments are payable by us in cash, in shares of our common stock, with such shares being valued for such purpose at the closing price of our common stock as reported on the Nasdaq Stock Market for the trading day immediately preceding the date of such payment if our common stock was then listed on the Nasdaq Stock Market, or a combination of shares and cash. In the event of a change of control of our company or a sale of our company, we are required to pay the related Company Sale Success Payment in cash within a specified period following such event. The Success Payments are cumulative and more than one Success Payment may be due and payable based on the average market capitalization on any trigger date. The maximum aggregate Success Payments that could be payable by us is $31.3 million. Certain of the Success Payments are only payable if a licensed product is or has been evaluated in clinical trials. To the extent we issue shares of our common stock in satisfaction of such Success Payments, we will be obligated to file a registration statement with the SEC to register the resale of such shares by Broad and Harvard.

Broad and Harvard, collectively, are entitled to receive mid single-digit percentage royalties on net sales of licensed products, and low single-digit percentage royalties on net sales of other products enabled by the license, made by us, our affiliates or our sublicensees. The royalty percentage depends on the aggregate amount of the net sales for the licensed or enabled products. If we are legally required to pay royalties to a third party on net sales of our licensed products because such third party holds patent rights that cover such licensed product, then we can credit, subject to a floor, up to a certain percentage of the amount paid to such third party against the royalties due to Broad and Harvard in the same period. On a target-by-target basis, if Editas initiates a program that uses technology covered by the Harvard/Broad Cas Patent Rights and is directed to one of the targets, then the milestone and royalty payments for that specific target shall be reduced by a certain percentage. Our obligation to pay royalties will expire on a product-by-product and country-by-country basis upon the later of (i) the expiration of the last to expire valid claim of the Harvard/Broad Cas9 Patent Rights that cover the composition, manufacture or use of each covered product in each country or (ii) the tenth anniversary of the date of the first commercial sale of the licensed or enabled product. If we sublicense any of the Harvard/Broad Cas9 Patent Rights to a third party, Broad and Harvard, collectively, have the right to receive between 10% and 20% of the sublicense income, which percentage shall decrease to a high single-digit after we meet certain clinical milestones.

Prosecution and enforcement provisions

Broad and Harvard retain control of the prosecution of their respective patent rights. We are obligated to reimburse Broad and Harvard for certain expenses associated with the prosecution and maintenance of the Harvard/Broad Cas9 Patent Rights, including expenses associated with any interference proceedings in the USPTO, any opposition proceedings in the European Patent Office, or any other *inter partes* or other post grant proceedings in these or other jurisdictions where we are seeking patent protection. Broad and Harvard are required to maintain any application or patent within the Harvard/Broad Patents Rights so long as we meet our obligation to reimburse Broad and Harvard for expenses related to prosecution, there is a good faith basis for doing so and doing so is consistent with Broad or Harvard's patent prosecution strategy. If we cease payment for the prosecution of any Harvard/Broad Cas9 Patent Right, then any license granted to us with respect to such Harvard/Broad Cas9 Patent Right will terminate.

We have the first right, but not the obligation, to enforce the Harvard/Broad Cas9-I Patent Rights with respect to our licensed products so long as certain conditions are met, such as providing Broad and Harvard with evidence demonstrating a good faith basis for bringing suit against a third party and subject to coordination with Editas. We are solely responsible for the costs of any lawsuits we elect to initiate and cannot enter into a settlement without the prior written consent of Broad and Harvard (and MIT, Rockefeller and Iowa, if applicable). Any sums recovered in such lawsuits will be shared among us, Broad and Harvard.

Termination provisions

Unless terminated earlier, the term of the Cas9 License Agreement will expire upon the expiration of the last to expire valid claim of the Harvard/Broad Cas9 Patent Rights. However, our royalty and milestone payment obligations, discussed above, may survive expiration or termination. We have the right to terminate the agreement at will upon four months' written notice to Broad and Harvard. Either we or Broad and Harvard may terminate the agreement upon a specified period of notice in the event of the other party's uncured material breach, such notice period varying depending on the nature of the breach. Both Broad and Harvard may terminate the Cas9 License Agreement immediately if we, or our affiliates or sublicensee(s), subject to our ability to cure, challenge the enforceability, validity or scope of any Harvard/Broad Patent Right or assist a third party to do so, or in the event of our bankruptcy or insolvency. Neither Broad nor Harvard acting alone has the right to terminate the Cas9 License Agreement. However, Broad and Harvard may separately terminate the licenses granted to us with respect to their respective patent rights upon the occurrence of the same events that would give rise to the right of both institutions acting collectively to terminate the Cas9 License Agreement.

Government regulation

Government authorities in the United States, at the federal, state and local level and in other countries and jurisdictions, including the European Union, extensively regulate, among other things, the research, development, testing, manufacture, pricing, reimbursement, sales, quality control, approval, packaging, storage, recordkeeping, labeling, advertising, promotion, distribution, marketing, post-approval monitoring and reporting and import and export of pharmaceutical products, including biological products. The processes for obtaining marketing approvals in the United States and in foreign countries and jurisdictions, along with subsequent compliance with applicable statutes and regulations and other regulatory authorities, require the expenditure of substantial time and financial resources.

Licensure and regulation of biologics in the United States

In the United States, any product candidates we may develop would be regulated as biological products, or biologics, under the Public Health Service Act, or PHSA, and the Federal Food, Drug and Cosmetic Act, or FDCA, and its implementing regulations and guidance. The failure to comply with the applicable U.S. requirements at any time during the product development process, including preclinical testing, clinical testing, the approval process, or post-approval process, may subject an applicant to delays in the conduct of the study, regulatory review and approval and/or administrative or judicial sanctions.

An applicant seeking approval to market and distribute a new biologic in the United States generally must satisfactorily complete each of the following steps:

- preclinical laboratory tests, animal studies and formulation studies all performed in accordance with the FDA's Good Laboratory Practices, or GLP regulations;
- completion of the manufacture, under cGMP conditions, of the drug substance and drug product that the sponsor intends to use in human clinical trials along with required analytical and stability testing;
- submission to the FDA of an IND application for human clinical testing, which must become effective before human clinical trials may begin;
- approval by an independent institutional review board, or IRB, representing each clinical site before each clinical trial may be initiated;

- performance of adequate and well-controlled human clinical trials to establish the safety, potency and purity of the product candidate for each proposed indication, in accordance with current Good Clinical Practices, or GCP;
- preparation and submission to the FDA of a BLA for a biologic product requesting marketing for one or more proposed indications, including submission of detailed information on the manufacture and composition of the product in clinical development and proposed labelling;
- review of the product by an FDA advisory committee, where appropriate or if applicable;
- satisfactory completion of one or more FDA inspections of the manufacturing facility or facilities, including those of third parties, at which the product, or components thereof, are produced to assess compliance with cGMP requirements and to assure that the facilities, methods and controls are adequate to preserve the product's identity, strength, quality and purity;
- satisfactory completion of any FDA audits of the preclinical studies and clinical trial sites to assure compliance with GLP, as applicable, and GCP, and the integrity of clinical data in support of the BLA;
- payment of user Prescription Drug User Fee Act, or PDUFA, securing FDA approval of the BLA and licensure of the new biologic product; and
- compliance with any post-approval requirements, including the potential requirement to implement a Risk Evaluation and Mitigation Strategy, or REMS, and any post-approval studies or other post-marketing commitments required by the FDA.

Preclinical studies and investigational new drug application

Before testing any biologic product candidate in humans, the product candidate must undergo preclinical testing. Preclinical tests include laboratory evaluations of product chemistry, formulation and stability, as well as studies to evaluate the potential for efficacy and toxicity in animal studies. The conduct of the preclinical tests and formulation of the compounds for testing must comply with federal regulations and requirements. The results of the preclinical tests, together with manufacturing information and analytical data, are submitted to the FDA as part of an IND application.

An IND is an exemption from the FDCA that allows an unapproved product candidate to be shipped in interstate commerce for use in an investigational clinical trial and a request for FDA authorization to administer such investigational product to humans. The IND automatically becomes effective 30 days after receipt by the FDA, unless before that time the FDA raises concerns or questions about the product or conduct of the proposed clinical trial, including concerns that human research subjects will be exposed to unreasonable health risks. In that case, the IND sponsor and the FDA must resolve any outstanding FDA concerns before the clinical trials can begin or recommence.

As a result, submission of the IND may result in the FDA not allowing the trials to commence or allowing the trial to commence on the terms originally specified by the sponsor in the IND. If the FDA raises concerns or questions either during this initial 30-day period, or at any time during the IND review process, it may choose to impose a partial or complete clinical hold. Clinical holds are imposed by the FDA whenever there is concern for patient safety, may be a result of new data, findings, or developments in clinical, preclinical and/or chemistry, manufacturing and controls or where there is non-compliance with regulatory requirements. This order issued by the FDA would delay either a proposed clinical trial or cause suspension of an ongoing trial, until all outstanding concerns have been adequately addressed and the FDA has notified the company that investigations may proceed. This could cause significant delays or difficulties in completing our planned clinical trial or future clinical trials in a timely manner.

Expanded access to an investigational drug for treatment use

Expanded access, sometimes called “compassionate use,” is the use of investigational products outside of clinical trials to treat patients with serious or immediately life-threatening diseases or conditions when there are no comparable or satisfactory alternative treatment options. The rules and regulations related to expanded access are intended to improve access to investigational products for patients who may benefit from investigational therapies. FDA regulations allow access to investigational products under an IND by the company or the treating physician for treatment purposes on a case-by-case basis for: individual patients (single-patient IND applications for treatment in emergency settings and non-emergency settings); intermediate-size patient populations; and larger populations for use of the investigational product under a treatment protocol or treatment IND application.

When considering an IND application for expanded access to an investigational product with the purpose of treating a patient or a group of patients, the sponsor and treating physicians or investigators will determine suitability when all of the following criteria apply: patient(s) have a serious or immediately life-threatening disease or condition, and there is no comparable or satisfactory alternative therapy to diagnose, monitor, or treat the disease or condition; the potential patient benefit justifies the potential risks of the treatment and the potential risks are not unreasonable in the context or condition to be treated; and the expanded use of the investigational drug for the requested treatment will not interfere with initiation, conduct, or completion of clinical investigations that could support marketing approval of the product or otherwise compromise the potential development of the product.

There is no obligation for a sponsor to make its drug products available for expanded access; however, as required by the 21st Century Cures Act, or Cures Act, passed in 2016, if a sponsor has a policy regarding how it responds to expanded access requests, it must make that policy publicly available. Sponsors are required to make such policies publicly available upon the earlier of initiation of a Phase 2 or Phase 3 trial; or 15 days after the investigational drug or biologic receives designation as a breakthrough therapy, fast track product, or regenerative medicine advanced therapy.

In addition, on May 30, 2018, the Right to Try Act was signed into law. The law, among other things, provides a federal framework for certain patients to access certain investigational products that have completed a Phase 1 clinical trial and that are undergoing investigation for FDA approval. Under certain circumstances, eligible patients can seek treatment without enrolling in clinical trials and without obtaining FDA permission under the FDA expanded access program. There is no obligation for a manufacturer to make its investigational products available to eligible patients as a result of the Right to Try Act.

Human clinical trials in support of a BLA

Clinical trials involve the administration of the investigational product candidate to healthy volunteers or patients with the disease or condition to be treated under the supervision of a qualified principal investigator in accordance with GCP requirements. Clinical trials are conducted under protocols detailing, among other things, the objectives of the trial, inclusion and exclusion criteria, the parameters to be used in monitoring safety, and the effectiveness criteria to be evaluated. A protocol for each clinical trial and any subsequent protocol amendments must be submitted to the FDA as part of the IND.

A sponsor who wishes to conduct a clinical trial outside the United States may, but need not, obtain FDA authorization to conduct the clinical trial under an IND. When a foreign clinical trial is conducted under an IND, all FDA IND requirements must be met unless waived. When a foreign clinical trial is not conducted under an IND, the sponsor must ensure that the trial complies with certain regulatory requirements of the FDA in order to use the trial as support for an IND or application for marketing approval. Specifically, the FDA requires that such trials be conducted in accordance with GCP, including review and approval by an independent ethics

committee and informed consent from participants. The GCP requirements encompass both ethical and data integrity standards for clinical trials. The FDA's regulations are intended to help ensure the protection of human subjects enrolled in non-IND foreign clinical trials, as well as the quality and integrity of the resulting data. They further help ensure that non-IND foreign trials are conducted in a manner comparable to that required for clinical trials in the United States.

Further, each clinical trial must be reviewed and approved by an IRB either centrally or individually at each institution at which the clinical trial will be conducted. The IRB will consider, among other things, clinical trial design, patient informed consent, ethical factors, the safety of human subjects, and the possible liability of the institution. An IRB must operate in compliance with FDA regulations. The FDA, IRB, or the clinical trial sponsor may suspend or discontinue a clinical trial at any time for various reasons, including a finding that the clinical trial is not being conducted in accordance with FDA requirements or that the participants are being exposed to an unacceptable health risk. Clinical testing also must satisfy extensive GCP rules and the requirements for informed consent.

Additionally, some clinical trials are overseen by an independent group of qualified experts organized by the clinical trial sponsor, known as a data safety monitoring board, or DSMB. This group may recommend continuation of the trial as planned, changes in trial conduct, or cessation of the trial at designated check points based on certain available data from the trial to which only the DSMB has access.

Clinical trials typically are conducted in three sequential phases, but the phases may overlap or be combined. Additional studies may be required after approval.

- *Phase 1* clinical trials are initially conducted in a limited population to test the product candidate for safety, including adverse effects, dose tolerance, absorption, metabolism, distribution, excretion and pharmacodynamics in healthy humans or, on occasion, in patients, such as cancer patients.
- *Phase 2* clinical trials are generally conducted in a limited patient population to identify possible adverse effects and safety risks, evaluate the efficacy of the product candidate for specific targeted indications and determine dose tolerance and optimal dosage. Multiple Phase 2 clinical trials may be conducted by the sponsor to obtain information prior to beginning larger and more costly Phase 3 clinical trials.
- *Phase 3* clinical trials proceed if the Phase 2 clinical trials demonstrate that a dose range of the product candidate is potentially effective and has an acceptable safety profile. Phase 3 clinical trials are undertaken within an expanded patient population to further evaluate dosage, provide substantial evidence of clinical efficacy and further test for safety in an expanded and diverse patient population at multiple, geographically dispersed clinical trial sites. A well-controlled, statistically robust Phase 3 trial may be designed to deliver the data that regulatory authorities will use to decide whether or not to approve, and, if approved, how to appropriately label a biologic; such Phase 3 studies are referred to as "pivotal."

In some cases, the FDA may approve a BLA for a product but require the sponsor to conduct additional clinical trials to further assess the product's safety and effectiveness after approval. Such post-approval trials are typically referred to as Phase 4 clinical trials. These studies are used to gain additional experience from the treatment of patients in the intended therapeutic indication and to document a clinical benefit in the case of biologics approved under accelerated approval regulations. If the FDA approves a product while a company has ongoing clinical trials that were not necessary for approval, a company may be able to use the data from these clinical trials to meet all or part of any Phase 4 clinical trial requirement or to request a change in the product labeling. The failure to exercise due diligence with regard to conducting Phase 4 clinical trials could result in withdrawal of approval for products.

Information about applicable clinical trials must be submitted within specific timeframes to the National Institutes of Health, or NIH, for public dissemination on its ClinicalTrials.gov website.

Special regulations and guidance governing gene therapy products

It is possible that the procedures and standards applied to gene therapy products and cell therapy products may be applied to any product candidates we may develop, but that remains uncertain at this point. The FDA has defined a gene therapy product as one that mediates its effects by transcription and/or translation of transferred genetic material and/or by integrating into the host genome and which are administered as nucleic acids, viruses, or genetically engineered microorganisms. The products may be used to modify cells *in vivo* or transferred to cells *ex vivo* prior to administration to the recipient.

Within the FDA, the Center for Biologics Evaluation and Research, or CBER, regulates gene therapy products. Within CBER, the review of gene therapy and related products is consolidated in the OTAT and the FDA has established the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its reviews. The NIH, including the Novel and Exceptional Technology and Research Advisory Committee, also advises the FDA on gene therapy issues and other issues related to emerging biotechnologies. The FDA and the NIH have published guidance documents with respect to the development and submission of gene therapy protocols.

The FDA has issued various guidance documents regarding gene therapies, including recent final guidance documents released in January 2020 relating to chemistry, manufacturing and controls information for gene therapy INDs, long-term follow-up after the administration of gene therapy products, gene therapies for rare diseases and gene therapies for retinal disorders, as well as draft guidance in January 2021 for Human Gene Therapy for Neurodegenerative Diseases. Although the FDA has indicated that these and other guidance documents it previously issued are not legally binding, compliance with them is likely necessary to gain approval for any gene therapy product candidate. The guidance documents provide additional factors that the FDA will consider at each of the above stages of development and relate to, among other things: the proper preclinical assessment of gene therapies; the chemistry, manufacturing and control information that should be included in an IND application; the proper design of tests to measure product potency in support of an IND or BLA application; and measures to observe for potential delayed adverse effects in participants who have received investigational gene therapies with the duration of follow-up based on the potential for risk of such effects. For AAV vectors specifically, the FDA typically recommends that sponsors continue to monitor participants for potential gene therapy-related adverse events for up to a 5-year period.

Pediatric studies

Under the Pediatric Research Equity Act of 2003, or PREA, a BLA or supplement thereto must contain data that are adequate to assess the safety and effectiveness of the product for the claimed indications in all relevant pediatric subpopulations, and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. Sponsors must also submit pediatric study plans prior to the assessment data. Those plans must contain an outline of the proposed pediatric study or studies the applicant plans to conduct, including study objectives and design, any deferral or waiver requests, and other information required by regulation. The applicant, the FDA, and the FDA's internal review committee must then review the information submitted, consult with each other, and agree upon a final plan. The FDA or the applicant may request an amendment to the plan at any time.

The FDA may, on its own initiative or at the request of the applicant, grant deferrals for submission of some or all pediatric data until after approval of the product for use in adults, or full or partial waivers from the pediatric data requirements.

Compliance with cGMP requirements

Before approving a BLA, the FDA typically will 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 full compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. The PHSA emphasizes the importance of manufacturing control for products like biologics whose attributes cannot be precisely defined.

Manufacturers and others involved in the manufacture and distribution of products must also register their establishments with the FDA and certain state agencies. Both domestic and foreign manufacturing establishments must register and provide additional information to the FDA upon their initial participation in the manufacturing process. Any product manufactured by or imported from a facility that has not registered, whether foreign or domestic, is deemed misbranded under the FDCA. Establishments may be subject to periodic unannounced inspections by government authorities to ensure compliance with cGMPs and other laws. Inspections must follow a “risk-based schedule” that may result in certain establishments being inspected more frequently. Manufacturers may also have to provide, on request, electronic or physical records regarding their establishments. Delaying, denying, limiting, or refusing inspection by the FDA may lead to a product being deemed to be adulterated.

Review and approval of a BLA

The results of product candidate development, preclinical testing and clinical trials, including negative or ambiguous results as well as positive findings, are submitted to the FDA as part of a BLA requesting license to market the product. The BLA must contain extensive manufacturing information and detailed information on the composition of the product and proposed labeling as well as payment of a user fee. Under federal law, the submission of most BLAs is subject to a substantial application user fee. The sponsor of a licensed BLA is also subject to an annual program fee. Certain exceptions and waivers are available for some of these fees, such as an exception from the application fee for products with orphan designation and a waiver for certain small businesses.

The FDA has 60 days after submission of the application to conduct an initial review to determine whether it is sufficient to accept for filing based on the agency’s threshold determination that it is sufficiently complete to permit substantive review. Once the submission has been accepted for filing, the FDA begins an in-depth review of the application. Under the goals and policies agreed to by the FDA under the PDUFA, the FDA has ten months in which to complete its initial review of a standard application and respond to the applicant, and six months for a priority review of the application. The FDA does not always meet its PDUFA goal dates for standard and priority BLAs. The review process may often be significantly extended by FDA requests for additional information or clarification.

Under the PHSA, the FDA may approve a BLA if it determines that the product is safe, pure and potent, and the facility where the product will be manufactured meets standards designed to ensure that it continues to be safe, pure and potent. On the basis of the FDA’s evaluation of the application and accompanying information, including the results of the inspection of the manufacturing facilities and any FDA audits of preclinical and clinical trial sites to assure compliance with GCPs, the FDA may issue an approval letter or a complete response letter, or CRL. An approval letter authorizes commercial marketing of the product with specific prescribing information for specific indications. If the application is not approved, the FDA will issue a CRL, which will contain the conditions that must be met in order to secure final approval of the application, and when possible will outline recommended actions the sponsor might take to obtain approval of the application. Sponsors that receive a CRL may submit to the FDA information that represents a complete response to the issues identified by the FDA.

The FDA may also refer the application to an advisory committee for review, evaluation and recommendation as to whether the application should be approved. In particular, the FDA may refer applications for novel biologic products or biologic products that present difficult questions of safety or efficacy to an advisory committee.

Typically, an advisory committee is a panel of independent experts, including clinicians and other scientific experts, that reviews, evaluates and provides a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions.

If the FDA approves a new product, it may limit the approved indication(s) for use of the product. It may also require that contraindications, warnings, or precautions be included in the product labeling. In addition, the FDA may call for post-approval studies, including Phase 4 clinical trials, to further assess the product's efficacy and/or safety after approval. The agency may also require testing and surveillance programs to monitor the product after commercialization, or impose other conditions, including distribution restrictions or other risk management mechanisms, including REMS, to help ensure that the benefits of the product outweigh the potential risks. REMS can include medication guides, communication plans for healthcare professionals and elements to assure safe use, or ETASU. ETASU can include, but are not limited to, special training or certification for prescribing or dispensing, dispensing only under certain circumstances, special monitoring and the use of patent registries. The FDA may prevent or limit further marketing of a product based on the results of post-market studies or surveillance programs. After approval, many types of changes to the approved product, such as adding new indications, manufacturing changes and additional labeling claims, are subject to further testing requirements and FDA review and approval.

Expedited review programs

The FDA is authorized to expedite the review of BLAs in several ways. Under the Fast Track program, the sponsor of a product candidate may request the FDA to designate the product for a specific indication as a Fast Track product concurrent with or after the filing of the IND. Candidate products are eligible for Fast Track designation if they are intended to treat a serious or life-threatening condition and demonstrate the potential to address unmet medical needs for the condition. Fast Track designation applies to the combination of the product candidate and the specific indication for which it is being studied. In addition to other benefits, such as the ability to have greater interactions with the FDA, the FDA may initiate review of sections of a Fast Track application before the application is complete, a process known as rolling review.

Any product candidate submitted to the FDA for marketing, including under a Fast Track program, may be eligible for other types of FDA programs intended to expedite development and review, such as breakthrough therapy designation, priority review and accelerated approval.

- *Breakthrough therapy designation.* To qualify for the breakthrough therapy program, product candidates must be intended to treat a serious or life-threatening disease or condition and preliminary clinical evidence must indicate that such product candidates may demonstrate substantial improvement on one or more clinically significant endpoints over existing therapies. The FDA will seek to ensure the sponsor of a breakthrough therapy product candidate receives intensive guidance on an efficient drug development program, intensive involvement of senior managers and experienced staff on a proactive, collaborative and cross-disciplinary review and rolling review.
- *Priority review.* A product candidate is eligible for priority review if it treats a serious condition and, if approved, it would be a significant improvement in the safety or effectiveness of the treatment, diagnosis or prevention compared to marketed products. FDA aims to complete its review of priority review applications within six months as opposed to 10 months for standard review.
- *Accelerated approval.* Drug or biologic products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may receive accelerated approval. Accelerated approval means that a product candidate may be approved on the basis of adequate and well controlled clinical trials establishing that the product candidate has an effect

on a surrogate endpoint that is reasonably likely to predict a clinical benefit, or on the basis of an effect on a clinical endpoint other than survival or irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity and prevalence of the condition and the availability or lack of alternative treatments. As a condition of approval, the FDA may require that a sponsor of a drug or biologic product candidate receiving accelerated approval perform adequate and well controlled post-marketing clinical trials. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials.

- *Regenerative advanced therapy.* With passage of the 21st Century Cures Act, or the Cures Act, in December 2016, Congress authorized the FDA to accelerate review and approval of products designated as regenerative advanced therapies. A product is eligible for this designation if it is a regenerative medicine therapy that is intended to treat, modify, reverse or cure a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the product candidate has the potential to address unmet medical needs for such disease or condition. The benefits of a regenerative advanced therapy designation include early interactions with the FDA to expedite development and review, benefits available to breakthrough therapies, potential eligibility for priority review and accelerated approval based on surrogate or intermediate endpoints.

None of these expedited programs change the standards for approval but they may help expedite the development or approval process of product candidates.

Post-approval regulation

If regulatory approval for marketing of a product or new indication for an existing product is obtained, the sponsor will be required to comply with all regular post-approval regulatory requirements as well as any post-approval requirements that the FDA have imposed as part of the approval process. The sponsor will be required to report certain adverse reactions and production problems to the FDA, provide updated safety and efficacy information and comply with requirements concerning advertising and promotional labeling requirements. Manufacturers and certain of 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 ongoing regulatory requirements, including cGMP regulations, which impose certain procedural and documentation requirements upon manufacturers. Accordingly, the sponsor and its third-party manufacturers must continue to expend time, money and effort in the areas of production and quality control to maintain compliance with cGMP regulations and other regulatory requirements.

A product may also be subject to official lot release, meaning that the manufacturer is required to perform certain tests on each lot of the product before it is released for distribution. If the product is subject to official lot release, the manufacturer must submit samples of each lot, together with a release protocol showing a summary of the history of manufacture of the lot and the results of all of the manufacturer's tests performed on the lot, to the FDA. The FDA may in addition perform certain confirmatory tests on lots of some products before releasing the lots for distribution. Finally, the FDA will conduct laboratory research related to the safety, purity, potency and effectiveness of pharmaceutical products.

Once an approval is granted, the FDA may withdraw the 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 trials to

assess new safety risks; or imposition of distribution 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 holds on post-approval clinical trials;
- refusal of the FDA to approve pending applications or supplements to approved applications, or suspension or revocation of product license approvals;
- product recall, seizure or detention, or refusal to permit the import or export of products; or
- injunctions or the imposition of civil or criminal penalties.

Pharmaceutical products may be promoted only for the approved indications and in accordance with the provisions of the approved label. Although healthcare providers may prescribe products for uses not described in the drug's labeling, known as off-label uses, in their professional medical judgment, drug manufacturers are prohibited from soliciting, encouraging or promoting unapproved uses of a product. Drug manufacturers may only share truthful and non-misleading information that is otherwise consistent with a product's FDA approved labeling. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant liability.

The FDA strictly regulates the marketing, labeling, advertising and promotion of prescription drug products placed on the market. This regulation includes, among other things, standards and regulations for direct-to-consumer advertising, communications regarding unapproved uses, industry-sponsored scientific and educational activities and promotional activities involving the Internet and social media. Promotional claims about a drug's safety or effectiveness are prohibited before the drug is approved. After approval, a drug product generally may not be promoted for uses that are not approved by the FDA, as reflected in the product's prescribing information.

If a company is found to have promoted off-label uses, it may become subject to adverse public relations and administrative and judicial enforcement by the FDA, the DOJ, or the Office of the Inspector General of the Department of Health and Human Services, as well as state authorities. This could subject a company to a range of penalties that could have a significant commercial impact, including civil and criminal fines and agreements that materially restrict the manner in which a company promotes or distributes drug products. The federal government has levied large civil and criminal fines against companies for alleged improper promotion and has also requested that companies enter into consent decrees or permanent injunctions under which specified promotional conduct is changed or curtailed.

Orphan drug designation

Orphan drug designation in the United States is designed to encourage sponsors to develop products intended for treatment of rare diseases or conditions. In the United States, a rare disease or condition is statutorily defined as a condition that affects fewer than 200,000 individuals in the United States or that affects more than 200,000 individuals in the United States and for which there is no reasonable expectation that the cost of developing and making available the biologic for the disease or condition will be recovered from sales of the product in the United States.

Orphan drug designation qualifies a company for tax credits and market exclusivity for seven years following the date of the product's marketing approval if granted by the FDA. An application for designation as an orphan

product can be made any time prior to the filing of an application for approval to market the product. A product becomes an orphan when it receives orphan drug designation from the Office of Orphan Products Development at the FDA based on acceptable confidential requests made under the regulatory provisions. The product must then go through the review and approval process like any other product.

A sponsor may request orphan drug designation of a previously unapproved product or new orphan indication for an already marketed product. In addition, a sponsor of a product that is otherwise the same product as an already approved orphan drug may seek and obtain orphan drug designation for the subsequent product for the same rare disease or condition if it can present a plausible hypothesis that its product may be clinically superior to the first drug. More than one sponsor may receive orphan drug designation for the same product for the same rare disease or condition, but each sponsor seeking orphan drug designation must file a complete request for designation.

If a product with orphan designation receives the first FDA approval for the disease or condition for which it has such designation or for a select indication or use within the rare disease or condition for which it was designated, the product generally will receive orphan drug exclusivity. Orphan drug exclusivity means that the FDA may not approve another sponsor's marketing application for the same product for the same indication for seven years, except in certain limited circumstances. If a product designated as an orphan drug ultimately receives marketing approval for an indication broader than what was designated in its orphan drug application, it may not be entitled to exclusivity.

The period of exclusivity begins on the date that the marketing application is approved by the FDA and applies only to the indication for which the product has been designated. Orphan drug exclusivity will not bar approval of another product under certain circumstances, including if the company with orphan drug exclusivity is not able to meet market demand or the subsequent product with the same drug for the same condition is shown to be clinically superior to the approved product on the basis of greater efficacy or safety, or providing a major contribution to patient care. This is the case despite an earlier court opinion holding that the Orphan Drug Act unambiguously required the FDA to recognize orphan drug exclusivity regardless of a showing of clinical superiority. Under Omnibus legislation signed by President Trump on December 27, 2020, the requirement for a product to show clinical superiority applies to drugs and biologics that received orphan drug designation before enactment of the FDA Reauthorization Act of 2017, but have not yet been approved or licensed by FDA.

Pediatric exclusivity

Pediatric exclusivity is another type of non-patent marketing exclusivity in the United States and, if granted, provides for the attachment of an additional six months of marketing protection to the term of any existing regulatory exclusivity, including the non-patent and orphan exclusivity. This six-month exclusivity may be granted if a BLA sponsor submits pediatric data that fairly respond to a written request from the FDA for such data. The data do not need to show the product to be effective in the pediatric population studied; rather, if the clinical trial is deemed to fairly respond to the FDA's request, the additional protection is granted. If reports of requested pediatric studies are submitted to and accepted by the FDA within the statutory time limits, whatever statutory or regulatory periods of non-patent exclusivity that cover the product are extended by six months.

Biosimilars and exclusivity

The 2010 Patient Protection and Affordable Care Act, which was signed into law in March 2010, included a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA. The BPCIA established a regulatory scheme authorizing the FDA to approve biosimilars and interchangeable biosimilars. A biosimilar is a biological product that is highly similar to an existing FDA-licensed "reference product." No interchangeable biosimilars, however, have been approved. The FDA has issued several guidance documents outlining an

approach to review and approval of biosimilars. Additional guidances are expected to be finalized by the FDA in the near term.

Under the BPCIA, a manufacturer may submit an application for licensure of a biologic product that is "biosimilar to" or "interchangeable with" a previously approved biological product or "reference product." In order for the FDA to approve a biosimilar product, it must find that there are no clinically meaningful differences between the reference product and proposed biosimilar product in terms of safety, purity and potency. For the FDA to approve a biosimilar product as interchangeable with a reference product, the agency must find that the biosimilar product can be expected to produce the same clinical results as the reference product, and (for products administered multiple times) that the biologic and the reference biologic may be switched after one has been previously administered without increasing safety risks or risks of diminished efficacy relative to exclusive use of the reference biologic.

Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date of approval of the reference product. The FDA may not approve a biosimilar product until 12 years from the date on which the reference product was approved. Even if a product is considered to be a reference product eligible for exclusivity, another company could market a competing version of that product if the FDA approves a full BLA for such product containing the sponsor's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of their 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. Since the passage of the BPCIA, many states have passed laws or amendments to laws, including laws governing pharmacy practices, which are state-regulated, to regulate the use of biosimilars.

Federal and state data privacy and security laws

Under the federal Health Insurance Portability and Accountability Act of 1966, or HIPAA, the U.S. Department of Health and Human Services, or HHS, has issued regulations to protect the privacy and security of protected health information, or PHI, used or disclosed by covered entities including certain healthcare providers, health plans and healthcare clearinghouses. HIPAA also regulates standardization of data content, codes and formats used in healthcare transactions and standardization of identifiers for health plans and providers. HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 or HITECH, and their regulations, including the omnibus final rule published on January 25, 2013, also imposes certain obligations on the business associates of covered entities that obtain protected health information in providing services to or on behalf of covered entities, as well as their covered subcontractors. In addition to federal privacy regulations, there are a number of state laws governing confidentiality and security of health information that are applicable to our business. In addition to possible federal civil and criminal penalties for HIPAA violations, state attorneys general are authorized to file civil actions for damages or injunctions in federal courts to enforce HIPAA and seek attorney's fees and costs associated with pursuing federal civil actions. Accordingly, state attorneys general (along with private plaintiffs) have brought civil actions seeking injunctions and damages resulting from alleged violations of HIPAA's privacy and security rules. New laws and regulations governing privacy and security may be adopted in the future as well.

Additionally, California recently enacted legislation that has been dubbed the first "GDPR-like" law in the United States. Known as the California Consumer Privacy Act, or CCPA, it creates new individual privacy rights for consumers (as that word is broadly defined in the law) and places increased privacy and security obligations on entities handling personal data of consumers or households. The CCPA went into effect on January 1, 2020 and requires covered companies to provide new disclosures to California consumers, provide such consumers new ways to opt-out of certain sales of personal information, and allow for a new cause of action for data breaches.

Additionally, effective starting on January 1, 2023, the California Privacy Rights Act, or CPRA, will significantly modify the CCPA, including by expanding consumers' rights with respect to certain sensitive personal information. The CPRA also creates a new state agency that will be vested with authority to implement and enforce the CCPA and the CPRA. The CCPA and CPRA could impact our business activities depending on how it is interpreted and exemplifies the vulnerability of our business to not only cyber threats but also the evolving regulatory environment related to personal data and protected health information.

Because of the breadth of these laws and the narrowness of the statutory exceptions and regulatory safe harbors available under such laws, it is possible that some of our current or future business activities, including certain clinical research, sales and marketing practices and the provision of certain items and services to our customers, could be subject to challenge under one or more of such privacy and data security laws. The heightening compliance environment and the need to build and maintain robust and secure systems to comply with different privacy compliance and/or reporting requirements in multiple jurisdictions could increase the possibility that a healthcare company may fail to comply fully with one or more of these requirements. If our operations are found to be in violation of any of the privacy or data security laws or regulations described above that are applicable to us, or any other laws that apply to us, we may be subject to penalties, including potentially significant criminal, civil and administrative penalties, damages, fines, imprisonment, contractual damages, reputational harm, diminished profits and future earnings, additional reporting requirements and/or oversight if we become subject to a consent decree or similar agreement to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations. To the extent that any product candidates we may develop, once approved, are sold in a foreign country, we may be subject to similar foreign laws.

Patent term restoration and extension

In the United States, a patent claiming a new biologic product, its method of use or its method of manufacture may be eligible for a limited patent term extension under the Hatch-Waxman Act, which permits a patent extension of up to five years for patent term lost during product development and FDA regulatory review. Assuming grant of the patent for which the extension is sought, the restoration period for a patent covering a product is typically one-half the time between the effective date of the IND and the submission date of the BLA, plus the time between the submission date of the BLA and the ultimate approval date. Patent term restoration cannot be used to extend the remaining term of a patent past a total of 14 years from the product's approval date in the United States. Only one patent applicable to an approved product is eligible for the extension, and the application for the extension must be submitted prior to the expiration of the patent for which extension is sought. A patent that covers multiple products for which approval is sought can only be extended in connection with one of the approvals. The USPTO reviews and approves the application for any patent term extension in consultation with the FDA.

FDA approval of companion diagnostics

In August 2014, the FDA issued final guidance clarifying the requirements that will apply to approval of therapeutic products and *in vitro* companion diagnostics. According to the guidance, for novel drugs, a companion diagnostic device and its corresponding therapeutic should be approved or cleared contemporaneously by the FDA for the use indicated in the therapeutic product's labeling. Approval or clearance of the companion diagnostic device will ensure that the device has been adequately evaluated and has adequate performance characteristics in the intended population. In July 2016, the FDA issued a draft guidance intended to assist sponsors of the drug therapeutic and *in vitro* companion diagnostic device on issues related to co-development of the products.

The 2014 guidance also explains that a companion diagnostic device used to make treatment decisions in clinical trials of a biologic product candidate generally will be considered an investigational device, unless it is employed for an intended use for which the device is already approved or cleared. If used to make critical treatment decisions, such as patient selection, the diagnostic device generally will be considered a significant risk device under the FDA's Investigational Device Exemption, or IDE, regulations. Thus, the sponsor of the diagnostic device will be required to comply with the IDE regulations. According to the guidance, if a diagnostic device and a product are to be studied together to support their respective approvals, both products can be studied in the same investigational study, if the study meets both the requirements of the IDE regulations and the IND regulations. The guidance provides that depending on the details of the study plan and subjects, a sponsor may seek to submit an IND alone, or both an IND and an IDE.

Under the FDCA, *in vitro* diagnostics, including companion diagnostics, are regulated as medical devices. In the United States, the FDCA and its implementing regulations, and other federal and state statutes and regulations govern, among other things, medical device design and development, preclinical and clinical testing, premarket clearance or approval, registration and listing, manufacturing, labeling, storage, advertising and promotion, sales and distribution, export and import and post-market surveillance. Unless an exemption applies, diagnostic tests require marketing clearance or approval from the FDA prior to commercial distribution.

The FDA previously has required *in vitro* companion diagnostics intended to select the patients who will respond to the product candidate to obtain pre-market approval, or PMA, simultaneously with approval of the therapeutic product candidate. The PMA process, including the gathering of clinical and preclinical data and the submission to and review by the FDA, can take several years or longer. It involves a rigorous premarket review during which the applicant must prepare and provide the FDA with reasonable assurance of the device's safety and effectiveness and information about the device and its components regarding, among other things, device design, manufacturing and labeling. PMA applications are subject to an application fee.

Regulation and procedures governing approval of medical products in the European Union

In order to market any product outside of the United States, a company must also comply with numerous and varying regulatory requirements of other countries and jurisdictions regarding quality, safety and efficacy and governing, among other things, clinical trials, marketing authorization, commercial sales and distribution of products. Whether or not it obtains FDA approval for a product, an applicant will need to obtain the necessary approvals by the comparable foreign regulatory authorities before it can commence clinical trials or marketing of the product in those countries or jurisdictions. Specifically, the process governing approval of medicinal products in the European Union generally follows the same lines as in the United States. It entails satisfactory completion of preclinical studies and adequate and well-controlled clinical trials to establish the safety and efficacy of the product for each proposed indication. It also requires the submission to the relevant competent authorities of a marketing authorization application, or MAA, and granting of a marketing authorization by these authorities before the product can be marketed and sold in the European Union.

Clinical trial approval

Pursuant to the currently applicable Clinical Trials Directive 2001/20/EC and the Directive 2005/28/EC on GCP, a system for the approval of clinical trials in the European Union has been implemented through national legislation of the member states. Under this system, an applicant must obtain approval from the competent national authority of a European Union member state in which the clinical trial is to be conducted, or in multiple member states if the clinical trial is to be conducted in a number of member states. Furthermore, the applicant may only start a clinical trial at a specific site after the competent ethics committee has issued a favorable opinion. The clinical trial application must be accompanied by an investigational medicinal product dossier with supporting information prescribed by Directive 2001/20/EC and Directive 2005/28/EC and corresponding national laws of the member states and further detailed in applicable guidance documents.

In April 2014, the European Union adopted a new Clinical Trials Regulation (EU) No 536/2014, but it has not yet become effective. It will overhaul the current system of approvals for clinical trials in the European Union. Specifically, the new legislation, which will be directly applicable in all member states, aims at simplifying and streamlining the approval of clinical trials in the European Union. For instance, the new Clinical Trials Regulation provides for a streamlined application procedure via a single-entry point and strictly defined deadlines for the assessment of clinical trial applications.

The conduct of all clinical trials performed in the EU will continue to be bound by currently applicable provisions until the new Clinical Trials Regulation becomes applicable. The extent to which on-going clinical trials will be governed by the Clinical Trials Regulation will depend on when the Clinical Trials Regulation becomes applicable and on the duration of the individual clinical trial. If a clinical trial continues for more than three years from the day on which the Clinical Trials Regulation becomes applicable the Clinical Trials Regulation will at that time begin to apply to the clinical trial.

On January 1, 2020, the website of the European Commission reported that the implementation of the new Clinical Trials Regulation was dependent on the development of a fully functional clinical trials portal and database, which would be confirmed by an independent audit, and that the new legislation would come into effect six months after the European Commission publishes a notice of this confirmation. In late 2020, the European Medicines Agency, or EMA, indicated that it plans to focus on the findings of a system audit; improving the usability, quality and stability of the clinical trial information system; and knowledge transfer to prepare users and their organizations for the new clinical trial system. The EMA has indicated that the system will go live in January 2022.

Parties conducting certain clinical trials must, as in the United States, post clinical trial information in the European Union at the EudraCT website: https://eudract.ema.europa.eu.

PRIME designation in the European Union

In March 2016, the EMA launched an initiative to facilitate development of product candidates in indications, often rare, for which few or no therapies currently exist. The PRIority MEdicines, or PRIME, scheme is intended to encourage drug development in areas of unmet medical need and provides accelerated assessment of products representing substantial innovation reviewed under the centralized procedure. Products from small- and medium-sized enterprises may qualify for earlier entry into the PRIME scheme than larger companies. Many benefits accrue to sponsors of product candidates with PRIME designation, including but not limited to, early and proactive regulatory dialogue with the EMA, frequent discussions on clinical trial designs and other development program elements, and accelerated marketing authorization application assessment once a dossier has been submitted. Importantly, a dedicated EMA contact and rapporteur from the Committee for Human Medicinal Products, or CHMP, or Committee for Advanced Therapies are appointed early in the PRIME scheme facilitating increased understanding of the product at the EMA's Committee level. A kick-off meeting initiates these relationships and includes a team of multidisciplinary experts at the EMA to provide guidance on the overall development and regulatory strategies.

Marketing authorization

To obtain a marketing authorization for a product under the European Union regulatory system, an applicant must submit an MAA, either under a centralized procedure administered by the EMA or one of the procedures administered by competent authorities in European Union Member States (decentralized procedure, national procedure, or mutual recognition procedure). A marketing authorization may be granted only to an applicant established in the European Union. Regulation (EC) No 1901/2006 provides that prior to obtaining a marketing authorization in the European Union, an applicant must demonstrate compliance with all measures included in an EMA-approved Pediatric Investigation Plan, or PIP, covering all subsets of the pediatric population, unless

the EMA has granted a product-specific waiver, class waiver or a deferral for one or more of the measures included in the PIP.

The centralized procedure provides for the grant of a single marketing authorization by the European Commission that is valid for all European Union member states. Pursuant to Regulation (EC) No. 726/2004, the centralized procedure is compulsory for specific products, including for medicines produced by certain biotechnological processes, products designated as orphan medicinal products, advanced therapy products and products with a new active substance indicated for the treatment of certain diseases, including products for the treatment of cancer. For products with a new active substance indicated for the treatment of other diseases and products that are highly innovative or for which a centralized process is in the interest of patients, the centralized procedure may be optional. Manufacturers must demonstrate the quality, safety and efficacy of their products to the EMA, which provides an opinion regarding the MAA. The European Commission grants or refuses marketing authorization in light of the opinion delivered by the EMA.

Specifically, the grant of marketing authorization in the European Union for products containing viable human tissues or cells such as gene therapy medicinal products is governed by Regulation 1394/2007/EC on advanced therapy medicinal products, read in combination with Directive 2001/83/EC of the European Parliament and of the Council, commonly known as the Community code on medicinal products. Regulation 1394/2007/EC lays down specific rules concerning the authorization, supervision and pharmacovigilance of gene therapy medicinal products, somatic cell therapy medicinal products and tissue engineered products. Manufacturers of advanced therapy medicinal products must demonstrate the quality, safety and efficacy of their products to EMA which provides an opinion regarding the application for marketing authorization. The European Commission grants or refuses marketing authorization in light of the opinion delivered by EMA.

Under the centralized procedure, the CHMP established at the EMA is responsible for conducting an initial assessment of a product. Under the centralized procedure in the European Union, the maximum timeframe for the evaluation of an MAA is 210 days, excluding clock stops when additional information or written or oral explanation is to be provided by the applicant in response to questions of the CHMP. Accelerated evaluation may be granted by the CHMP in exceptional cases, when a medicinal product is of major interest from the point of view of public health and, in particular, from the viewpoint of therapeutic innovation. If the CHMP accepts such a request, the time limit of 210 days will be reduced to 150 days, but it is possible that the CHMP may revert to the standard time limit for the centralized procedure if it determines that it is no longer appropriate to conduct an accelerated assessment.

Specialized procedures for gene therapies

As in the United States, it is unclear whether the regulatory authorities in the EU would treat our candidate products as gene therapy products. The grant of marketing authorization in the EU for gene therapy products is governed by Regulation 1394/2007/EC on advanced therapy medicinal products, read in combination with Directive 2001/83/EC of the European Parliament and of the Council, commonly known as the Community code on medicinal products. Regulation 1394/2007/EC includes specific rules concerning the authorization, supervision and pharmacovigilance of gene therapy medicinal products. Manufacturers of advanced therapy medicinal products must demonstrate the quality, safety and efficacy of their products to the EMA, which provides an opinion regarding the MAA. The European Commission grants or refuses marketing authorization in light of the opinion delivered by the EMA.

Pediatric studies

Prior to obtaining a marketing authorization in the European Union, applicants must demonstrate compliance with all measures included in an EMA-approved PIP covering all subsets of the pediatric population, unless the EMA has granted a product-specific waiver, a class waiver, or a deferral for one or more of the measures

included in the PIP. The respective requirements for all marketing authorization procedures are laid down in Regulation (EC) No 1901/2006, the so-called Paediatric Regulation. This requirement also applies when a company wants to add a new indication, pharmaceutical form or route of administration for a medicine that is already authorized. The Paediatric Committee of the EMA, or PDCO, may grant deferrals for some medicines, allowing a company to delay development of the medicine for children until there is enough information to demonstrate its effectiveness and safety in adults. The PDCO may also grant waivers when development of a medicine for children is not needed or is not appropriate, such as for diseases that only affect the elderly population. Before an MAA can be filed, or an existing marketing authorization can be amended, the EMA determines that companies actually comply with the agreed studies and measures listed in each relevant PIP.

Regulatory data protection in the European Union

In the European Union, new chemical entities approved on the basis of a complete independent data package qualify for eight years of data exclusivity upon marketing authorization and an additional two years of market exclusivity pursuant to Regulation (EC) No 726/2004, as amended, and Directive 2001/83/EC, as amended. Data exclusivity prevents regulatory authorities in the European Union from referencing the innovator's data to assess a generic (abbreviated) application for a period of eight years. During the additional two-year period of market exclusivity, a generic marketing authorization application can be submitted, and the innovator's data may be referenced, but no generic medicinal product can be marketed until the expiration of the market exclusivity. The overall ten-year period will be extended to a maximum of eleven years if, during the first eight years of those ten years, the marketing authorization holder obtains an authorization for one or more new therapeutic indications which, during the scientific evaluation prior to authorization, is held to bring a significant clinical benefit in comparison with existing therapies. Even if a compound is considered to be a new chemical entity so that the innovator gains the prescribed period of data exclusivity, another company may market another version of the product if such company obtained marketing authorization based on an MAA with a complete independent data package of pharmaceutical tests, preclinical tests and clinical trials.

Patent term extensions in the European Union and other jurisdictions

The European Union also provides for patent term extension through Supplementary Protection Certificates, or SPCs. The rules and requirements for obtaining a SPC are similar to those in the United States. An SPC may extend the term of a patent for up to five years after its originally scheduled expiration date and can provide up to a maximum of fifteen years of marketing exclusivity for a drug. In certain circumstances, these periods may be extended for six additional months if pediatric exclusivity is obtained, which is described in detail below. Although SPCs are available throughout the European Union, sponsors must apply on a country-by-country basis. Similar patent term extension rights exist in certain other foreign jurisdictions outside the European Union.

Periods of authorization and renewals

A marketing authorization is valid for five years, in principle, and it may be renewed after five years on the basis of a reevaluation of the risk-benefit balance by the EMA or by the competent authority of the authorizing member state. To that end, the marketing authorization holder must provide the EMA or the competent authority with a consolidated version of the file in respect of quality, safety and efficacy, including all variations introduced since the marketing authorization was granted, at least six months before the marketing authorization ceases to be valid. Once renewed, the marketing authorization is valid for an unlimited period, unless the European Commission or the competent authority decides, on justified grounds relating to pharmacovigilance, to proceed with one additional five-year renewal period. Any authorization that is not followed by the placement of the drug on the European Union market (in the case of the centralized procedure) or on the market of the authorizing member state within three years after authorization ceases to be valid.

Regulatory requirements after marketing authorization

Following approval, the holder of the marketing authorization is required to comply with a range of requirements applicable to the manufacturing, marketing, promotion and sale of the medicinal product. These include compliance with the European Union's stringent pharmacovigilance or safety reporting rules, pursuant to which post-authorization studies and additional monitoring obligations can be imposed. In addition, the manufacturing of authorized products, for which a separate manufacturer's license is mandatory, must also be conducted in strict compliance with the EMA's GMP requirements and comparable requirements of other regulatory bodies in the European Union, which mandate the methods, facilities and controls used in manufacturing, processing and packing of drugs to assure their safety and identity. Finally, the marketing and promotion of authorized products, including industry-sponsored continuing medical education and advertising directed toward the prescribers of drugs and/or the general public, are strictly regulated in the European Union under Directive 2001/83EC, as amended.

Orphan drug designation and exclusivity

Regulation (EC) No 141/2000 and Regulation (EC) No. 847/2000 provide that a product can be designated as an orphan drug by the European Commission if its sponsor can establish: that the product is intended for the diagnosis, prevention or treatment of (1) a life-threatening or chronically debilitating condition affecting not more than five in ten thousand persons in the European Union when the application is made, or (2) a life-threatening, seriously debilitating or serious and chronic condition in the European Union and that without incentives it is unlikely that the marketing of the drug in the European Union would generate sufficient return to justify the necessary investment. For either of these conditions, the applicant must demonstrate that there exists no satisfactory method of diagnosis, prevention or treatment of the condition in question that has been authorized in the European Union or, if such method exists, the drug will be of significant benefit to those affected by that condition.

An orphan drug designation provides a number of benefits, including fee reductions, regulatory assistance and the possibility to apply for a centralized European Union marketing authorization. Marketing authorization for an orphan drug leads to a ten-year period of market exclusivity. During this market exclusivity period, neither the EMA nor the European Commission or the member states can accept an application or grant a marketing authorization for a "similar medicinal product." A "similar medicinal product" is defined as a medicinal product containing a similar active substance or substances as contained in an authorized orphan medicinal product, and which is intended for the same therapeutic indication. The market exclusivity period for the authorized therapeutic indication may, however, be reduced to six years if, at the end of the fifth year, it is established that the product no longer meets the criteria for orphan drug designation because, for example, the product is sufficiently profitable not to justify market exclusivity.

Pediatric exclusivity

If an applicant obtains a marketing authorization in all EU Member States, or a marketing authorization granted in the centralized procedure by the European Commission, and the study results for the pediatric population are included in the product information, even when negative, the medicine is then eligible for an additional six-month period of qualifying patent protection through extension of the term of the Supplementary Protection Certificate, or SPC.

Review and approval of medical devices

The European Union has adopted numerous directives and standards regulating, among other things, the design, manufacture, clinical trials, labeling, approval and adverse event reporting for medical devices. Medical devices must comply with the Essential Requirements in Annex I to the currently applicable EU Medical Devices

Directive (Council Directive 93/42/EEC) and in-vitro diagnostic medical devices must comply with the Essential Requirements in Annex I to the currently applicable EU In-Vitro Diagnostic Medical Devices Directive (Directive 98/79/EC), or the Essential Requirements. Compliance with these requirements is a prerequisite to be able to affix the CE Mark of Conformity to medical devices or in-vitro diagnostic medical devices, without which they cannot be marketed or sold in the European Economic Area, or EEA, comprised of the European Union member states plus Norway, Iceland, and Liechtenstein.

To demonstrate compliance with the Essential Requirements a manufacturer must undergo a conformity assessment procedure, which varies according to the type of medical device and its classification. Except for low risk medical devices, where the manufacturer can issue a CE Declaration of Conformity based on a self-assessment of the conformity of its products with the Essential Requirements, a conformity assessment procedure requires the intervention of a third-party organization designated by competent authorities of a European Union country to conduct conformity assessments, or a Notified Body. For companion diagnostics, which are regulated as in-vitro diagnostic devices in the EU, if the medicinal product component falls within the centralized procedure the Notified Body must seek a scientific opinion from the EMA on the suitability of the companion diagnostic to the medicinal product concerned. Notified Bodies are independent testing houses, laboratories, or product certifiers typically based within the EU and authorized by the European member states to perform the required conformity assessment tasks, such as quality system audits and device compliance testing.

The legal framework currently applicable for medical devices in the European Union will soon be amended by Medical Devices Regulation (Regulation (EU) 2017/745) adopted in 2017, which repeals and replaces the EU Medical Devices Directive. Unlike directives, which must be implemented into the national laws of the EEA member states, the Medical Devices Regulation (MDR) will be directly applicable (i.e., without the need for adoption of EEA member state laws implementing them) in all EEA member states and are intended to eliminate current differences in the regulation of medical devices among EEA member states. The Medical Devices Regulation, among other things, is intended to establish a uniform, transparent, predictable and sustainable regulatory framework across the EEA for medical and ensure a high level of safety and health. In addition, the In Vitro Diagnostic Regulation (IVDR) (EU) 2017/746, which entered into force on May 25, 2017, will replace the EU In Vitro Diagnostics Directive (IVDD) 98/79/EC. Manufacturers wishing to apply to a notified body for a conformity assessment of their in vitro diagnostic medical device have until the date of application of the IVDR in May 2022 to update their technical documentation to meet the requirements and comply with the new, more stringent regulation.

Currently, the MDR is scheduled to become applicable on May 26, 2021 and the IVDR will become applicable in May 2022. Once applicable, these regulations will, among other things:

- strengthen the rules on placing devices on the market and reinforce surveillance once they are available;
- establish explicit provisions on manufacturers' responsibilities for the follow-up of the quality, performance and safety of devices placed on the market;
- improve the traceability of medical devices throughout the supply chain to the end-user or patient through a unique identification number;
- set up a central database to provide patients, healthcare professionals and the public with comprehensive information on products available in the EU; and
- strengthen rules for the assessment of certain high-risk devices, such as implants, which may have to undergo an additional check by experts before they are placed on the market.

Brexit and the regulatory framework in the United Kingdom

On June 23, 2016, the electorate in the United Kingdom voted in favor of leaving the European Union, commonly referred to as Brexit. Following protracted negotiations, the United Kingdom left the European Union on January 31, 2020. Pursuant to the formal withdrawal arrangements agreed between the United Kingdom and the European Union, the United Kingdom was subject to a transition period until December 31, 2020, during which European Union rules continued to apply. A trade and cooperation agreement, or the Trade and Cooperation Agreement, which outlines the future trading relationship between the United Kingdom and the European Union was agreed in December 2020. Great Britain is no longer covered by the European Union's procedures for the grant of marketing authorizations (Northern Ireland is covered by the centralized authorization procedure and can be covered under the decentralized or mutual recognition procedures). A separate marketing authorization will be required to market drugs in Great Britain. For two years from 1 January 2021, the Medicines and Healthcare products Regulatory Agency, or MHRA, may adopt decisions taken by the European Commission on the approval of new marketing authorizations through the centralized procedure, and the MHRA will have regard to marketing authorizations approved in a country in the European Economic Area (although in both cases a marketing authorization will only be granted if any Great Britain-specific requirements are met). Various national procedures are now available to place a drug on the market in the United Kingdom, Great Britain, or Northern Ireland, with the main national procedure having a maximum timeframe of 150 days (excluding time taken to provide any further information or data required). The data exclusivity periods in the United Kingdom are currently in line with those in the European Union, but the Trade and Cooperation Agreement provides that the periods for both data and market exclusivity are to be determined by domestic law, and so there could be divergence in the future. It is currently unclear whether the MHRA in the United Kingdom is sufficiently prepared to handle the increased volume of marketing authorization applications that it is likely to receive.

Also, notwithstanding the United Kingdom's withdrawal from the European Union, by operation of the so-called 'UK GDPR' (i.e., the EU General Data Protection Regulation, or GDPR, as it continues to form part of the law of the United Kingdom by virtue of section 3 of the EU (Withdrawal) Act 2018 and as subsequently amended) the GDPR continues to apply in substantially equivalent form to processing operations carried out in the context of an establishment in the United Kingdom and any processing relating to the offering of goods or services to individuals in the United Kingdom and/or monitoring of their behavior in the United Kingdom.

However, it is still unclear whether transfers of data from the EEA to the United Kingdom will remain lawful under the GDPR. The Trade and Cooperation Agreement provides for a transitional period during which the UK will be treated like an EU member state in relation to processing and transfers of personal data for four months from January 1, 2021. This may be extended by two further months. After such period, the United Kingdom will be a "third country" under the GDPR (and transfers of data from the EEA to the United Kingdom will require a 'transfer mechanism' such as the Standard Contractual Clauses) unless the European Commission adopts an adequacy decision in respect of transfers of personal data to the United Kingdom. While the European Commission has published draft adequacy decisions in respect of the United Kingdom, these are subject to further review and it remains to be seen whether or when any such decisions will be adopted. The UK government has already determined that it considers all EU 27 and EEA member states to be adequate for the purposes of data protection, ensuring that data flows from the United Kingdom to the European Union and EEA remain unaffected. We may, however, incur liabilities, expenses, costs and other operational losses under GDPR and applicable European Union Member States and the United Kingdom privacy laws in connection with any measures we take to comply with them. Furthermore, in general terms, there will now be increasing scope for divergence in application, interpretation and enforcement of the data protection law as between the United Kingdom and EEA.

General Data Protection Regulation

The collection, use, disclosure, transfer or other processing of personal data in the context of the activities of an establishment in the European Economic Area and/or regarding the offering of goods or services to, and/or the monitoring of the behavior of individuals in the European Economic Area, including health data, is subject to the GDPR, which became effective on May 25, 2018. As noted above, by operation of the so-called 'UK GDPR,' the GDPR continues to apply in substantially equivalent form in the context of the UK, UK establishments and UK-focused processing operations—so, when we refer to the GDPR in this section, we are also making reference to the UK GDPR in the context of the United Kingdom, unless the context requires otherwise.

The GDPR is wide-ranging in scope and imposes numerous, significant and complex requirements on companies that process personal data, such as: requiring the establishment of a legal basis for processing personal data; broadening the definition of personal data (including to capture 'pseudonymized' or key-coded data that is commonly processed in a clinical trial-related context); creating obligations for controllers and processors to appoint data protection officers in certain circumstances; increasing transparency obligations to data subjects; establishing limitations on the retention of personal data; introducing obligations to honor increased rights for data subjects; formalizing a heightened standard of data subject consent; establishing obligations to implement certain technical and organizational safeguards to protect the security and confidentiality of personal data; introducing obligations to agree to certain specific contractual terms and to take certain measures when working with third-party processors or joint controllers; introducing the obligation to provide notice of certain significant personal data breaches to the relevant supervisory authority(ies) and affected individuals; and mandating the appointment of representatives in the UK and/or EU in certain circumstances. In particular, the processing of "special category personal data" (such as personal data related to health and genetic information), which will be relevant to our operations in the context of clinical trials, imposes heightened compliance burdens under the GDPR and is a topic of active interest among relevant regulators. In addition, the GDPR provides that EEA member states may introduce specific requirements related to the processing of special categories of personal data such as health data that we may process in connection with clinical trials or otherwise. In the UK, the UK Data Protection Act 2018 complements the UK GDPR in this regard. More broadly, European data protection authorities may interpret the GDPR and national laws differently and impose additional requirements, which contributes to the complexity of processing personal data in or from the EEA and/or United Kingdom. Guidance on implementation and compliance practices is often updated or otherwise revised. This fact may lead to greater divergence on the law that applies to the processing of personal data across the EEA and/or UK, which may increase our costs and overall compliance risk. Such country-specific regulations could also limit our ability to process relevant personal data in the context of our EEA and/or UK operations ultimately having an adverse impact on our business, and harming our business and financial condition.

The GDPR also imposes strict rules on the transfer of personal data to countries outside Europe, including to the United States, unless the parties to the transfer have implemented specific safeguards to protect the transferred personal data. Certain previously available safeguards have been invalidated, and reliance on alternative safeguards may be complex or not possible in certain circumstances, following a recent ruling of the Court of Justice of the European Union and subsequent regulatory guidance. If we are unable to implement a valid solution for personal data transfers from the EEA/United Kingdom, including, for example, obtaining individuals' explicit consent to transfer their personal data to the United States or other countries, we will face increased exposure to regulatory actions, substantial fines and injunctions against transferring personal data from EEA/United Kingdom. Inability to export personal data from the EEA/United Kingdom may also: restrict our activities outside EEA/United Kingdom; limit our ability to collaborate with partners as well as other service providers, contractors and other companies outside of EEA/United Kingdom; and/or require us to increase our processing capabilities within the EEA and/or United Kingdom at significant expense or otherwise cause us to change the geographical location or segregation of our relevant systems and operations—any or all of which

could adversely affect our operations or financial results. Additionally, other countries outside of EEA/United Kingdom have enacted or are considering enacting similar cross-border data transfer restrictions and laws requiring local data residency, which could increase the cost and complexity of delivering our services and operating our business.

The GDPR also provides for more robust regulatory enforcement and permits supervisory authorities to impose greater penalties for violations than under previous European data protection laws, including potential fines of up to €20 million or 4% of annual global revenues for the preceding financial year, whichever is greater. In addition to administrative fines, a wide variety of other potential enforcement powers are available to supervisory authorities in respect of potential and suspected violations of the GDPR, including extensive audit and inspection rights, and powers to order temporary or permanent bans on all or some processing of personal data carried out by noncompliant actors. The GDPR also confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies and obtain compensation for damages resulting from violations of the GDPR. Compliance with the GDPR will be a rigorous and time-intensive process that may increase the cost of doing business or require companies to change their business practices to ensure full compliance. Additionally, the transposition of the EU GDPR into UK domestic law by way of the UK GDPR could expose us to two parallel regimes where the UK GDPR and EU GDPR both apply, each of which potentially authorizes similar fines and other potentially divergent enforcement actions for certain violations.

If we fail, or are perceived to have failed, to address or comply with the GDPR, in addition to regulatory enforcement action (including as described above), individuals or other relevant stakeholders could bring a variety of claims against us for our actual or perceived failure to comply. Any of these events could have a material adverse effect on our reputation, business, or financial condition, and could lead to a loss of actual or prospective customers, collaborators or partners; interrupt or stop clinical trials; result in an inability to process personal information or to operate in certain jurisdictions; limit our ability to develop or commercialize our products; or require us to revise or restructure our operations.

Coverage, pricing and reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any product candidates for which we may seek regulatory approval by the FDA or other government authorities. In the United States and markets in other countries, patients who are prescribed treatments for their conditions and providers performing the prescribed services generally rely on third-party payers to reimburse all or part of the associated healthcare costs. Patients are unlikely to use any product candidates we may develop unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost of such product candidates. Even if any product candidates we may develop are approved, sales of such product candidates will depend, in part, on the extent to which third-party payers, including government health programs in the United States such as Medicare and Medicaid, commercial health insurers and managed care organizations, provide coverage and establish adequate reimbursement levels for, such product candidates. The process for determining whether a payer will provide coverage for a product may be separate from the process for setting the price or reimbursement rate that the payer will pay for the product once coverage is approved. Third-party payers are increasingly challenging the prices charged, examining the medical necessity, and reviewing the cost-effectiveness of medical products and services and imposing controls to manage costs. Third-party payers may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the approved products for a particular indication.

In order to secure coverage and reimbursement for any product that might be approved for sale, a company may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of the product, in addition to the costs required to obtain FDA or other comparable marketing approvals. Nonetheless, product candidates may not be considered medically necessary or cost

effective. A decision by a third-party payer not to cover any product candidates we may develop could reduce physician utilization of such product candidates once approved and have a material adverse effect on our sales, results of operations and financial condition. Additionally, a payer's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Further, one payer's determination to provide coverage for a product does not assure that other payers will also provide coverage and reimbursement for the product, and the level of coverage and reimbursement can differ significantly from payer to payer. Third-party reimbursement and coverage may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development. In addition, any companion diagnostic tests require coverage and reimbursement separate and apart from the coverage and reimbursement for their companion pharmaceutical or biological products. Similar challenges to obtaining coverage and reimbursement, applicable to pharmaceutical or biological products, will apply to any companion diagnostics.

The containment of healthcare costs also has become a priority of federal, state and foreign governments and the prices of pharmaceuticals have been a focus in this effort. Governments have shown significant interest in implementing cost-containment programs, including price controls, restrictions on reimbursement and requirements for substitution of generic products. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit a company's revenue generated from the sale of any approved products. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which a company or its collaborators receive marketing approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

If we obtain approval in the future to market in the United States any product candidates we may develop, we may be required to provide discounts or rebates under government healthcare programs or to certain government and private purchasers in order to obtain coverage under federal healthcare programs such as Medicaid. Participation in such programs may require us to track and report certain drug prices. We may be subject to fines and other penalties if we fail to report such prices accurately.

Outside the United States, ensuring adequate coverage and payment for any product candidates we may develop will face challenges. Pricing of prescription pharmaceuticals is subject to governmental control in many countries. Pricing negotiations with governmental authorities can extend well beyond the receipt of regulatory marketing approval for a product and may require us to conduct a clinical trial that compares the cost effectiveness of any product candidates we may develop to other available therapies. The conduct of such a clinical trial could be expensive and result in delays in our commercialization efforts.

In the European Union, pricing and reimbursement schemes vary widely from country to country. Some countries provide that products may be marketed only after a reimbursement price has been agreed. Some countries may require the completion of additional studies that compare the cost-effectiveness of a particular product candidate to currently available therapies (so called health technology assessments) in order to obtain reimbursement or pricing approval. For example, the European Union provides options for its member states to restrict the range of products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. European Union member states may approve a specific price for a product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the product on the market. Other member states allow companies to fix their own prices for products but monitor and control prescription volumes and issue guidance to physicians to limit prescriptions. Recently, many countries in the European Union have increased the amount of discounts required on pharmaceuticals and these efforts could continue as countries attempt to manage healthcare expenditures, especially in light of the severe fiscal and debt crises experienced by many countries in the European Union. The downward pressure on healthcare costs in general, particularly prescription products, has become intense. As a result, increasingly high barriers are being erected to the entry of new products. Political, economic and

regulatory developments may further complicate pricing negotiations and pricing negotiations may continue after reimbursement has been obtained. Reference pricing used by various European Union member states, and parallel trade (arbitrage between low-priced and high-priced member states), can further reduce prices. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products, if approved in those countries.

Healthcare law and regulation

Health care providers and third-party payors play a primary role in the recommendation and prescription of drug products that are granted marketing approval. Arrangements with providers, consultants, third-party payors and customers are subject to broadly applicable fraud and abuse, anti-kickback, false claims laws, patient privacy laws and regulations and other health care laws and regulations that may constrain business and/or financial arrangements.

Restrictions under applicable federal and state health care laws and regulations, include the federal Anti-Kickback Statute, which prohibits, among other things, persons and entities from knowingly and willfully soliciting, offering, paying, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made, in whole or in part, under a federal health care program such as Medicare and Medicaid; the federal civil and criminal false claims laws, including the civil False Claims Act, and civil monetary penalties laws, which prohibit individuals or entities from, among other things, knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false, fictitious or fraudulent or knowingly making, using or causing to made or used a false record or statement to avoid, decrease or conceal an obligation to pay money to the federal government; HIPAA, which created additional federal criminal statutes that prohibit, among other things, a person from knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private third-party payors and knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services; the Foreign Corrupt Practices Act, or FCPA, which prohibits companies and their intermediaries from making, or offering or promising to make, improper payments to non-U.S. officials for the purpose of obtaining or retaining business or otherwise seeking favorable treatment; and the federal transparency requirements known as the federal Physician Payments Sunshine Act, which requires certain manufacturers of drugs, devices, biologics and medical supplies to report annually to the Centers for Medicare & Medicaid Services, or CMS, within the United States Department of Health and Human Services, information related to payments and other transfers of value made by that entity to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors), and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members, and, beginning in 2022, will require applicable manufacturers to report information regarding payments and other transfers of value provided during the previous year to physician assistants, nurse practitioners, clinical nurse specialists, certified registered nurse anesthetists, anesthesiologist assistants, and certified nurse midwives.

Further, some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government in addition to requiring manufacturers to report information related to payments to physicians and other health care providers or marketing expenditures. Additionally, some state and local laws require the registration of pharmaceutical sales representatives in the jurisdiction. State and foreign laws also govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Efforts to ensure that our business arrangements comply with applicable healthcare laws involve substantial costs. It is possible that governmental and enforcement authorities will conclude that our business practices do not comply with current or future statutes, regulations or case law interpreting applicable fraud and abuse or other healthcare laws and regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, we may be subject to significant penalties, including administrative, civil and criminal penalties, damages, fines, exclusion from participation in United States federal or state health care programs, such as Medicare and Medicaid, disgorgement, imprisonment, integrity oversight and reporting obligations, and the curtailment or restructuring of our operations.

Healthcare reform

A primary trend in the U.S. healthcare industry and elsewhere is cost containment. There have been a number of federal and state proposals during the last few years regarding the pricing of pharmaceutical and biopharmaceutical products, limiting coverage and reimbursement for drugs and other medical products, government control and other changes to the healthcare system in the United States.

In March 2010, the United States Congress enacted the ACA, which, among other things, includes changes to the coverage and payment for drug products under government health care programs. Other legislative changes have been proposed and adopted since the ACA was enacted. In August 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. These changes included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, which went into effect in April 2013 and will remain in effect through 2030, with the exception of a temporary suspension from May 1, 2020 through December 31, 2021, unless additional Congressional action is taken. The American Taxpayer Relief Act of 2012, among other things, reduced Medicare payments to several providers and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These laws may result in additional reductions in Medicare and other healthcare funding and otherwise affect the prices we may obtain for any of our product candidates for which we may obtain regulatory approval or the frequency with which any such product candidate is prescribed or used.

Since enactment of the ACA, there have been, and continue to be, numerous legal challenges and Congressional actions to repeal and replace provisions of the law. For example, legislation enacted in 2017, informally titled the Tax Cuts and Jobs Act of 2017, repealed the "individual mandate." The repeal of this provision, which requires most Americans to carry a minimal level of health insurance, became effective in 2019. Further, on December 14, 2018, a U.S. District Court judge in the Northern District of Texas ruled that the individual mandate portion of the ACA is an essential and inseverable feature of the ACA, and therefore because the mandate was repealed as part of the Tax Cuts and Jobs Act, the remaining provisions of the ACA are invalid as well. On December 18, 2019, the Court of Appeals for the Fifth Circuit court affirmed the lower court's ruling that the individual mandate portion of the ACA is unconstitutional and it remanded the case to the district court for reconsideration of the severability question and additional analysis of the provisions of the ACA. Thereafter, the U.S. Supreme Court agreed to hear this case. Oral argument in the case took place on November 10, 2020. On February 10, 2021, the Biden administration withdrew DOJ's support for this lawsuit. A ruling by the Court is expected sometime this year. Litigation and legislation over the ACA are likely to continue, with unpredictable and uncertain results.

The Trump administration also took executive actions to undermine or delay implementation of the ACA, including directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from, or delay the implementation of any provision of the ACA that would impose a fiscal or

regulatory burden on states, individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. On January 28, 2021, however, President Biden revoked those orders and issued a new Executive Order which directs federal agencies to reconsider rules and other policies that limit Americans' access to health care, and consider actions that will protect and strengthen that access. Under this Order, federal agencies are directed to re-examine: policies that undermine protections for people with pre-existing conditions, including complications related to COVID-19; demonstrations and waivers under Medicaid and the ACA that may reduce coverage or undermine the programs, including work requirements; policies that undermine the Health Insurance Marketplace or other markets for health insurance; policies that make it more difficult to enroll in Medicaid and the ACA; and policies that reduce affordability of coverage or financial assistance, including for dependents.

The costs of prescription pharmaceuticals have also been the subject of considerable discussion in the United States. To date, there have been several recent U.S. Congressional inquiries, as well as proposed and enacted state and federal legislation designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, reduce the costs of drugs under Medicare and reform government program reimbursement methodologies for drug products. To those ends, President Trump issued seven executive orders intended to lower the costs of prescription drug products but it is unclear whether, and to what extent, these orders will remain in force under the Biden administration. Further, on September 24, 2020, the Trump administration finalized a rule allowing states or certain other non-federal government entities to submit importation program proposals to the FDA for review and approval. Applicants are required to demonstrate that their importation plans pose no additional risk to public health and safety and will result in significant cost savings for consumers. The FDA has issued draft guidance that would allow manufacturers to import their own FDA-approved drugs that are authorized for sale in other countries (multi-market approved products).

At the state level, individual states are increasingly aggressive in passing legislation and implementing 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. In addition, regional health care organizations 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 health care programs. These measures could reduce the ultimate demand for our products, once approved, or put pressure on our product pricing. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our product candidates or additional pricing pressures. It is also possible that additional governmental action will be taken in response to the COVID-19 pandemic.

Employees and human capital resources

As of May 31, 2021, we had 70 full-time employees, including 28 employees with M.D., Pharm.D. or Ph.D. degrees. Of these full-time employees, 56 are engaged in research and development activities and 14 are engaged in general and administrative activities. None of our employees is represented by a labor union or covered by a collective bargaining agreement. 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.

Properties and facilities

We occupy 19,823 square feet of office and laboratory space in Cambridge, Massachusetts under a sublease that expires in August 2022 with an option to extend for an additional three months. We believe that our facilities are sufficient to meet our current needs and that suitable additional space will be available as and when needed.

Legal proceedings

We are currently not a party to any material legal proceedings.

Certain of the U.S. patents and one U.S. patent application to which we hold an option are subject to interferences. See “Risk factors—Risks related to our intellectual property—Our owned patent applications and in-licensed patents and patent applications and other intellectual property may be subject to priority or inventorship disputes, interferences and similar proceedings. If we or our licensors are unsuccessful in any of these proceedings, we may be required to obtain licenses from third parties, which may not be available on commercially reasonable terms or at all, or to cease the development, manufacture, and commercialization of one or more of the product candidates we may develop, which could have a material adverse impact on our business.”

Management

Executive officers, directors and other key employees

The following table sets forth the name, age as of May 31, 2021 and position of each of our executive officers, directors and other key employees.

Name	Age	Position
Executive officers		
Sekar Kathiresan, M.D.	49	Chief Executive Officer, Director
Andrew Ashe, J.D.	54	President and Chief Operating Officer
Andrew Bellinger, M.D., Ph.D.	43	Chief Scientific Officer
Non-employee directors		
Burt Adelman, M.D.(1)(2)(3)	69	Chairman of the Board of Directors
John Evans(2)	44	Director
Michael MacLean(1)	55	Director
Sheila Mikhail(1)(3)	54	Director
Krishna Yeshwant, M.D.(2)(3)	43	Director
Other key employees		
Margaret Beaudoin	52	Vice President, Finance
Yasser El-Gamal, J.D.	54	Vice President, Legal Affairs and Chief Intellectual Property Counsel
Richard Falzone	47	Vice President, Clinical Operations
Hari Jayaram, Ph.D.	46	Vice President, Editing and Discovery
Joan Nickerson	54	Senior Vice President, Human Resources
Jason Politi	44	Senior Vice President, Technical Operations
Kallanthottathil Rajeev, Ph.D.	55	Vice President, Chemistry, Manufacturing and Controls
Ellen Rohde, Ph.D.	54	Vice President, Preclinical Pharmacology and Toxicology
Leslie Stolz, Ph.D.	49	Vice President, Regulatory Affairs

(1) Member of the Audit Committee.

(2) Member of the Compensation Committee.

(3) Member of the Nominating and Corporate Governance Committee.

Executive officers

Sekar Kathiresan, M.D. has served as our chief executive officer since July 2019. Prior to joining our company, Dr. Kathiresan was a cardiologist at Massachusetts General Hospital (MGH) from July 1997 to July 2019. Dr. Kathiresan served as director of the MGH Center for Genomic Medicine from April 2016 to June 2019 and was the Ofer and Shelly Nemirovsky MGH Research Scholar from 2013 to 2018. He also served as director of the

Cardiovascular Disease Initiative at The Broad Institute from 2014 to June 2019 and was professor of medicine at Harvard Medical School from June 2018 to June 2019. Dr. Kathiresan holds a B.A. in history from the University of Pennsylvania and an M.D. from Harvard Medical School. He completed his clinical training in internal medicine and cardiology at MGH and his postdoctoral research training in human genetics at the Framingham Heart Study and The Broad Institute. We believe that Dr. Kathiresan's leadership, experience in the life sciences industry and his extensive knowledge of our company based on his current role as our chief executive officer qualify him to serve on our board of directors.

Andrew Ashe, J.D. has served as our president and chief operating officer since August 2018. Prior to joining our company, Mr. Ashe served as general counsel of Applied Genetic Technologies Corporation, a biotechnology company, from August 2017 to August 2018. Mr. Ashe was a consultant for Shire plc, or Shire, a pharmaceutical company, following Shire's acquisition of Dyax Corp., or Dyax, a commercial-stage biotechnology company, from January 2016 until September 2016. He served in various roles at Dyax from June 2003 until its acquisition by Shire in January 2016, including general counsel and executive vice president, operations and administration from January 2013 to January 2016, general counsel and senior vice president, administration from January 2007 to January 2013 and associate general counsel from June 2003 to December 2006. Earlier in his career, Mr. Ashe served as a trading specialist and senior analyst at the American and New York Stock Exchanges. Mr. Ashe's expertise includes legal affairs as well as financial and operations management. Mr. Ashe holds a B.B.A. in finance from the Isenberg School of Management at the University of Massachusetts, Amherst and a J.D. from The George Washington University Law School.

Andrew Bellinger, M.D., Ph.D. has served as our chief scientific officer since October 2019. Dr. Bellinger has been a cardiologist at Brigham and Women's Hospital since August 2015 and is board-certified in cardiovascular medicine and internal medicine. Dr. Bellinger previously served as chief scientific officer of Lyndra Therapeutics, Inc., a clinical-stage biotechnology company, which he co-founded, from July 2015 to September 2019. Prior to Lyndra, Dr. Bellinger served as chief scientific officer of Cocoon Biotech, Inc., a biotechnology company, from February 2014 to February 2015. Dr. Bellinger has served on the board of directors of Corner Therapeutics, Inc., a biotechnology company that he co-founded, since September 2019. Dr. Bellinger's scientific expertise includes translational medicine, drug delivery, biomedical engineering and clinical strategy. Dr. Bellinger holds an A.B. in physics from Princeton University, an M.S. in mathematics from New York University and an M.D. and Ph.D. from Columbia University.

Non-employee directors

Burt Adelman, M.D. has served on our board of directors since February 2018. Dr. Adelman has provided consulting services as a senior advisor to Novo Ventures US Inc., a venture capital firm, since September 2017. Previously, Dr. Adelman was executive vice president, research and development and chief medical officer of Dyax from February 2012 until its acquisition by Shire plc in January 2016. Prior to joining Dyax, he worked at Sesen Bio, Inc. (formerly known as Eleven Biotherapeutics Inc.), a biotechnology company, where he served as interim president of research and development from 2010 to 2011 and as senior advisor from February 2011 until December 2011. From 1991 to 2007, Dr. Adelman held positions of increasing responsibility at Biogen Inc., a global biotechnology company, ultimately as executive vice president, portfolio strategy. From 1998 through 2020, Dr. Adelman served as a lecturer in medicine at Harvard Medical School and as an associate physician at Brigham and Women's Hospital. Dr. Adelman previously served on the board of directors of Catabasis Pharmaceuticals, Inc., a pharmaceuticals company, from April 2016 to January 2021. Dr. Adelman holds a B.S. in biology from Trinity College and an M.D. from Cornell Medical College. He completed residency training and a hematology fellowship at the Peter Bent Brigham Hospital. We believe that Dr. Adelman is qualified to serve on our board of directors because of his broad experience in drug development and his depth of knowledge of our company based on his role as a co-founder.

John Evans has served on our board of directors since August 2018. Mr. Evans has served as chief executive officer of Beam Therapeutics Inc., a biotechnology company, since January 2018 and served as the interim chief executive officer from April 2017 to January 2018. Mr. Evans served as a venture partner with ARCH Venture Partners, a venture capital firm, from April 2017 to March 2021. Mr. Evans was previously employed at Agios Pharmaceuticals, Inc., a biopharmaceutical company, from September 2009 to March 2017, most recently serving as senior vice president for corporate development and portfolio leadership. At Agios, Mr. Evans also served as IDH portfolio executive. Prior to joining Agios, Mr. Evans worked at Infinity Pharmaceuticals, Inc., a biopharmaceutical company, McKinsey & Company Inc.'s pharmaceuticals practice and MedImmune, LLC, the global biologics research and development arm of AstraZeneca plc, a biopharmaceutical company. Mr. Evans also serves on the board of directors of Beam Therapeutics Inc. Mr. Evans holds a B.A. in English from Yale University, an M.S. in biotechnology from the University of Pennsylvania and an M.B.A. in healthcare management from the Wharton School of the University of Pennsylvania. We believe Mr. Evans is qualified to serve on our board of directors because of his extensive experience in the pharmaceutical industry.

Michael MacLean has served on our board of directors since May 2021. Mr. MacLean has served as chief financial officer of Avidity Biosciences, Inc., a publicly traded biopharmaceutical company pioneering a new class of oligonucleotide-based therapies, since May 2020. Mr. MacLean previously served as chief financial officer of Akcea Therapeutics, Inc., a biopharmaceutical company focused on developing and commercializing drugs to treat patients with serious and rare disease that was acquired by Ionis Pharmaceuticals, Inc. in October 2020, from September 2017 to April 2020. Prior to his time at Akcea, Mr. MacLean served as chief financial officer of PureTech Health plc, a clinical-stage biotherapeutics company dedicated to discovering, developing and commercializing highly differentiated medicines for devastating diseases, from September 2015 to August 2017. Mr. MacLean is a former certified public accountant who practiced accounting for more than 18 years, during which time he served as a partner of Arthur Andersen LLP and KPMG International Limited. Mr. MacLean received a B.S. in Accounting from Boston College. We believe Mr. MacLean is qualified to serve on our board of directors because of his experience as a chief financial officer of life sciences companies and his experience in the life sciences industry.

Sheila Mikhail, J.D. has served on our board of directors since April 2021. Ms. Mikhail has served as chief executive officer of Asklepios BioPharmaceutical, Inc., or AskBio, an AAV gene therapy company that was acquired by Bayer AG in 2020, since April 2017. She co-founded AskBio in 2001. Ms. Mikhail previously served as chief executive officer of Bamboo Therapeutics, Inc., a gene therapy company that she co-founded, from December 2014 until its acquisition by Pfizer Inc. in November 2016. Prior to Bamboo, Ms. Mikhail was part of the management team at Chatham Therapeutics, LLC, a clinical development-stage biotechnology company engaged in the development of novel, gene therapy-mediated treatments for hemophilia, from 2010 until its acquisition by Baxter International Inc. in 2014. Ms. Mikhail has practiced law for more than 15 years, during which time she founded and served as managing member of Life Sciences Law, PLLC, which serviced clients including Bayer, Gilead Sciences, Inc., GlaxoSmithKline plc and Sanofi-Aventis Amerique du Nord S.N.C. Ms. Mikhail received a B.S. from the University of Illinois at Urbana-Champaign, a J.D. from Northwestern University and an M.B.A. from the University of Chicago Booth School of Business. We believe Ms. Mikhail is qualified to serve on our board of directors because of her experience as a chief executive officer of life sciences companies and her experience in the life sciences industry.

Krishna Yeshwant, M.D. has served on our board of directors since August 2018. Dr. Yeshwant has served as a managing partner at GV since June 2009 and has been working with GV since June 2008. Dr. Yeshwant has also been employed by Partners Healthcare, a not-for-profit health care system, as an Internal Medicine physician at Brigham and Women's Hospital since 2009. Before joining GV, Dr. Yeshwant founded Stanford Students Consulting, an electronic data interchange company that was acquired by The Hewlett-Packard Company in 2000. In 2000, he founded Recourse Technologies, Inc., a network security company that was acquired by

Symantec Corporation in 2002. Dr. Yeshwant previously served on the board of directors of Foundation Medicine, Inc., a molecular information company, from 2011 to July 2018. Dr. Yeshwant received a B.S. in computer science from Stanford University, an M.D. from Harvard Medical School and an M.B.A. from Harvard Business School. We believe Dr. Yeshwant is qualified to serve on our board of directors because of his medical experience as a physician, his experience working with and serving on the boards of directors of life sciences companies and his experience working in the venture capital industry.

Other key employees

Margaret Beaudoin has served as our vice president, finance since March 2021 and served as our senior director, finance from June 2020 until March 2021. Ms. Beaudoin has 30 years of experience in finance, with 17 years in life sciences. Ms. Beaudoin most recently served as senior director, financial planning and analysis at Applied Genetics Technology Corporation, a biotechnology company, from March 2018 until May 2020. Previously, Ms. Beaudoin served as a financial consultant at Selecta Biosciences, Inc., a biopharmaceutical company, from March 2017 until March 2018. From May 2011 through March 2017, Ms. Beaudoin served as director, finance corporate at Syneos Health, Inc. (formerly InVentiv Health, Inc.), a contract research organization. Ms. Beaudoin holds a B.A. in economics from the University of Massachusetts Amherst and a certified public accountant license in Massachusetts.

Yasser El-Gamal, *J.D.* has served as our vice president, legal affairs and chief intellectual property counsel since February 2021. Mr. El-Gamal has over 25 years of experience in advising technology companies on a broad spectrum of business and legal matters. Prior to joining Verve, Mr. El-Gamal was a partner at Manatt, Phelps & Phillips, LLP, a law firm, from October 2014 to February 2021, where he served as co-chair of the intellectual property prosecution and litigation practices. Previously, Mr. El-Gamal was an equity partner at Dickstein Shapiro LLP, a law firm, from February 2011 to October 2014. Mr. El-Gamal holds a B.S. in mechanical engineering from the University of Minnesota, an M.S. in biotechnology from Johns Hopkins University and a J.D. from The George Washington University Law School.

Richard Falzone has served as our vice president, clinical operations since April 2021. Mr. Falzone has over 20 years of experience in clinical operations, having worked in roles of increasing responsibility and across multiple therapeutic areas. From April 2009 until March 2021, Mr. Falzone served in various roles in clinical operations at Alnylam Pharmaceuticals, Inc., or Alnylam, a biopharmaceutical company. Most recently at Alnylam, Mr. Falzone served as senior director, clinical operations, where he oversaw three clinical programs with five trials in Phase 3. Mr. Falzone holds a B.S. in microbiology from the University of New Hampshire and a master's degree in public health from Tufts University.

Hari Jayaram, *Ph.D.* has served as our vice president, editing and discovery since April 2021. Dr. Jayaram's scientific expertise spans from structure guided drug discovery and computational biology to protein engineering and gene editing. From February 2018 to April 2021, Dr. Jayaram served as vice president, technology at Spotlight Therapeutics, Inc., an early-stage biotechnology company. From April 2014 to January 2018, Dr. Jayaram served in progressive roles at Editas Medicine, Inc., a genome editing company, ultimately serving as associate director, protein engineering and computational biology. Previously, Dr. Jayaram served as senior scientist II and as a senior scientist, biochemistry and structural biology at Constellation Pharmaceuticals, Inc., a clinical-stage biopharmaceutical company, from October 2010 until April 2014. Dr. Jayaram holds an MSc in biotechnology from the Indian Institute of Technology, a BSc in chemistry from the University of Bombay and a Ph.D. in structural and computational biology and molecular biophysics from Baylor College of Medicine.

Joan Nickerson has served as our senior vice president, human resources and facilities since April 2021. Ms. Nickerson has over 25 years of experience in human resources with more than 12 years of experience in life sciences. Ms. Nickerson previously served as senior vice president, human resources at Sarepta Therapeutics,

Inc., a global biotechnology company, from October 2016 to March 2021. From 2012 to March 2016, Ms. Nickerson held roles of increasing responsibility at Dyax, ultimately serving as senior director of human resources and administrative services. Ms. Nickerson holds a B.S. in business administration from the University of Massachusetts Lowell and an M.B.A. from Simmons College.

Jason Politi has served as our senior vice president, technical operations since February 2021. Mr. Politi has over 20 years of biotechnology industry experience. Mr. Politi previously served as senior vice president, technical operations and project management at Prevail Therapeutics, Inc., a gene therapy company acquired by Eli Lilly and Company, from November 2017 to February 2021. Prior to Prevail, Mr. Politi served as senior director, clinical manufacturing at Alexion Pharmaceuticals, Inc., or Alexion, a global biopharmaceutical company, from May 2016 to November 2017. Previously, Mr. Politi served as director, manufacturing at Dyax from October 2014 to May 2016, director, supply chain and CMC program management at Synageva BioPharma Corporation, a biopharmaceutical company acquired by Alexion, from August 2013 to October 2014 and in progressive roles in supply chain functions at Biogen Inc., or Biogen, from May 2006 to August 2013. Mr. Politi holds a B.S. in chemical engineering from Massachusetts Institute of Technology and an M.B.A. from Boston College Carroll School of Management.

Kallanthottathil Rajeev, Ph.D. has served as our vice president, chemistry, manufacturing and controls since September 2018. Dr. Rajeev has over 25 years of expertise in nucleic acid chemistry and 18 years of experience in developing nucleic acid therapeutics. Previously, Dr. Rajeev served in various roles at Alnylam from June 2003 to May 2018 and most recently served as senior fellow of intellectual property and as senior director of drug discovery. Dr. Rajeev holds a B.S. and M.S. in chemistry from University of Calicut and earned his Ph.D. in chemistry in the lab of Professor K. N. Ganesh at the National Chemical Laboratory and was a postdoctoral researcher at the University of Utah, Salt Lake City.

Ellen Rohde, Ph.D. has served as our vice president, preclinical pharmacology and toxicology since October 2019. Dr. Rohde has extensive drug development experience with a focus on translational sciences, drug metabolism and pharmacokinetics (DMPK) and bioanalysis. Previously, Dr. Rohde served as senior director, pharmacokinetics and distribution at Intellia Therapeutics, Inc., a clinical-stage genome editing company, from December 2016 to September 2019. Prior to Intellia, Dr. Rohde served as director, analytical chemistry and DMPK at Cerulean Pharma Inc., a biopharmaceutical company, from September 2015 to November 2016. From January 2005 to March 2015, Dr. Rohde served in progressive roles in preclinical DMPK at Biogen. Dr. Rohde earned her master’s degree in chemistry from the University of Leipzig and her Ph.D. in analytical chemistry from the University of Cincinnati.

Leslie Stolz, *Ph.D.* has served as our vice president of regulatory affairs since June 2019. Dr. Stolz has 18 years of experience in the life sciences industry, with extensive drug development experience, and has worked in multiple therapeutic areas including immunology, cardiology and rare diseases. Previously, Dr. Stolz served as vice president, regulatory strategy at Syntimmune, Inc., a biotechnology company acquired by Alexion, from December 2016 to February 2019. From February 2008 to November 2016, Dr. Stolz served in various roles at Dyax, most recently as director, regulatory affairs. Dr. Stolz holds a B.S. in biology from Villanova University and a Ph.D. in molecular cancer biology from Duke University.

Board composition and election of directors

Board composition

Our board of directors currently consists of six members. Our directors hold office until their successors have been elected and qualified or until the earlier of their death, resignation or removal.

Our certificate of incorporation and bylaws that will become effective upon the closing of this offering provide that the authorized number of directors may be changed only by resolution of our board of directors. Our

certificate of incorporation and bylaws will also provide that our directors may be removed only for cause by the affirmative vote of the holders of 75% of our shares of capital stock present in person or by proxy and entitled to vote, and that any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, may be filled only by vote of a majority of our directors then in office.

In accordance with the terms of our certificate of incorporation and bylaws that will become effective upon the closing of this offering, our board of directors will be divided into three classes, class I, class II and class III, with members of each class serving staggered three-year terms. As a result, 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. Upon the closing of this offering, the members of the classes will be divided as follows:

- the class I directors will be John Evans and Krishna Yeshwant, and their term will expire at the annual meeting of stockholders to be held in 2022;
- the class II directors will be Michael MacLean and Sheila Mikhail, and their term will expire at the annual meeting of stockholders to be held in 2023; and
- the class III directors will be Burt Adelman and Sekar Kathiresan, and their term will expire at the annual meeting of stockholders to be held in 2024.

Upon the expiration of the term of a class of directors, directors in that class will be eligible to be elected for a new three-year term at the annual meeting of stockholders in the year in which their term expires.

The classification of our board of directors may have the effect of delaying or preventing changes in our control or management. See “Description of capital stock—Delaware anti-takeover law and certain charter and bylaw provisions.”

Director independence

Applicable Nasdaq rules require a majority of a listed company’s board of directors to be comprised of independent directors within one year of listing. In addition, Nasdaq rules require that, subject to specified exceptions, each member of a listed company’s audit, compensation and nominating and corporate governance committees be independent under the Securities Exchange Act of 1934, as amended, or the Exchange Act. Audit committee members must also satisfy the independence criteria set forth in Rule 10A-3 under the Exchange Act and compensation committee members must also satisfy the independence criteria set forth in Rule 10C-1 under the Exchange Act. Under applicable Nasdaq rules, a director will only qualify as an “independent director” if, in the opinion of the listed company’s board of directors, that person does not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director. In order to be considered independent for purposes of Rule 10A-3, a member of an audit committee of a listed company may not, other than in his or her capacity as a member of the audit committee, the board of directors or any other board committee, accept, directly or indirectly, any consulting, advisory or other compensatory fee from the listed company or any of its subsidiaries or otherwise be an affiliated person of the listed company or any of its subsidiaries. In order to be considered independent for purposes of Rule 10C-1, the board must consider, for each member of a compensation committee of a listed company, all factors specifically relevant to determining whether a director has a relationship to such company which is material to that director’s ability to be independent from management in connection with the duties of a compensation committee member, including, but not limited to: (1) the source of compensation of the director, including any consulting advisory or other compensatory fee paid by such company to the director; and (2) whether the director is affiliated with the company or any of its subsidiaries or affiliates.

In May 2021, our board of directors undertook a review of the composition of our board of directors and its committees and the independence of each director. Based upon information requested from and provided by

each director concerning his or her background, employment and affiliations, including family relationships, our board of directors has determined that each of our directors, with the exception of Dr. Kathiresan and Mr. Evans, is an "independent director" as defined under applicable Nasdaq rules, including, in the case of all the members of our audit committee, the independence criteria set forth in Rule 10A-3 under the Exchange Act, and in the case of all the members of our compensation committee, the independence criteria set forth in Rule 10C-1 under the Exchange Act. In making such determination, our board of directors considered the relationships that each such non-employee director has with our company and all other facts and circumstances that our board of directors deemed relevant in determining his or her independence, including the beneficial ownership of our capital stock by each non-employee director. Dr. Kathiresan is not an independent director under these rules because he is our chief executive officer. Mr. Evans is not an independent director under these rules because of the transactions between us and Beam Therapeutics Inc., for which Mr. Evans serves as chief executive officer. See "Transactions with related persons" for additional information.

There are no family relationships among any of our directors or executive officers.

Board committees

Our board of directors has established an audit committee, a compensation committee and a nominating and corporate governance committee, each of which will operate under a charter to be adopted by our board of directors. The composition of each committee will be effective as of the date of this prospectus.

Audit committee

The members of our audit committee are Burt Adelman, Michael MacLean and Sheila Mikhail. Michael MacLean is the chair of the audit committee. Our audit committee's responsibilities will include:

- appointing, approving the compensation of, and assessing the independence of our registered public accounting firm;
- overseeing the work of our independent registered public accounting firm, including through the receipt and consideration of reports from that firm;
- reviewing and discussing with management and our independent registered public accounting firm our annual and quarterly financial statements and related disclosures;
- monitoring our internal control over financial reporting, disclosure controls and procedures and code of business conduct and ethics;
- overseeing our internal audit function;
- overseeing our risk assessment and risk management policies;
- establishing policies regarding hiring employees from our independent registered public accounting firm and procedures for the receipt and retention of accounting-related complaints and concerns;
- meeting independently with our internal auditing staff, if any, our independent registered public accounting firm and management;
- reviewing and approving or ratifying any related person transactions; and
- preparing the audit committee report required by Securities and Exchange Commission, or SEC, rules.

All audit and non-audit services, other than *de minimis* non-audit services, to be provided to us by our independent registered public accounting firm must be approved in advance by our audit committee.

Our board of directors has determined that Michael MacLean and Sheila Mikhail are “audit committee financial experts” as defined in applicable SEC rules and that each of the members of our audit committee possesses the financial sophistication required for audit committee members under Nasdaq rules. We believe that the composition of our audit committee meets the requirements for independence under current Nasdaq and SEC rules and regulations.

Compensation committee

The members of our compensation committee are Burt Adelman, John Evans and Krishna Yeshwant. Burt Adelman is the chair of the compensation committee. Our compensation committee’s responsibilities include:

- reviewing and approving, or making recommendations to our board of directors with respect to, the compensation of our chief executive officer and our other executive officers;
- overseeing and administering our cash and equity incentive plans;
- reviewing and making recommendations to our board of directors with respect to director compensation;
- reviewing and discussing annually with management our “Compensation Discussion and Analysis” disclosure if and to the extent then required by SEC rules; and
- preparing the compensation committee report if and to the extent then required by SEC rules.

Our board of directors has determined that each of Burt Adelman and Krishna Yeshwant is independent under applicable Nasdaq listing standards. Under applicable Nasdaq rules, we are permitted to phase in our compliance with the independent compensation committee requirements of Nasdaq as follows: (1) one independent member at the time of listing, (2) a majority of independent members within 90 days of listing and (3) all independent members within one year of listing. Our board of directors intends to cause our compensation committee to comply with the transition rules within the applicable time periods.

Nominating and corporate governance committee

The members of our nominating and corporate governance committee are Burt Adelman, Sheila Mikhail and Krishna Yeshwant. Burt Adelman is the chair of the nominating and corporate governance committee. Our nominating and corporate governance committee’s responsibilities include:

- recommending to our board of directors the persons to be nominated for election as directors and to each of our board’s committees;
- reviewing and making recommendations to our board with respect to our board leadership structure;
- reviewing and making recommendations to our board with respect to management succession planning;
- developing and recommending to our board of directors corporate governance principles; and
- overseeing a periodic evaluation of our board of directors.

We believe that the composition of our nominating and corporate governance committee meets the requirements for independence under current Nasdaq and SEC rules and regulations.

Compensation committee interlocks and insider participation

None of our executive officers serves as a member of the board of directors or compensation committee, or other committee serving an equivalent function, of any other entity that has one or more of its executive officers serving as a member of our board of directors or our compensation committee. None of the members of our compensation committee is, or has ever been, an officer or employee of our company.

Code of business conduct and ethics

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. We have posted a current copy of the code on our website, www.vervetx.com. In addition, we intend to post on our website all disclosures that are required by law or Nasdaq listing standards concerning any amendments to, or waivers from, any provision of the code.

Executive compensation

The following discussion relates to the compensation of Sekar Kathiresan, M.D., our chief executive officer, Andrew Bellinger, M.D., Ph.D., our chief scientific officer, and Andrew Ashe, J.D., our president and chief operating officer. Dr. Kathiresan, Mr. Ashe and Dr. Bellinger are collectively referred to in this prospectus as our named executive officers.

In preparing to become a public company, we have begun a thorough review of all elements of our executive compensation program, including the function and design of our equity incentive programs. We have begun, and expect to continue in the coming months, to evaluate the need for revisions to our executive compensation program to ensure that our program is competitive with the companies with which we compete for executive talent and is appropriate for a public company. This discussion may contain forward-looking statements that are based on our current plans, considerations, expectations and determinations regarding future compensation programs.

Summary compensation table

The following table sets forth information regarding compensation awarded to, earned by or paid to each of our named executive officers for the year ended December 31, 2020.

Name and principal position	Year	Salary($)	Bonus($)(1)	Option awards ($)(2)	All other compensation($)	Total($)
Sekar Kathiresan, M.D. *Chief Executive Officer*	2020	480,000	230,400	1,687,500	11,592(3)	2,409,492
Andrew Bellinger, M.D., Ph.D. *Chief Scientific Officer*	2020	350,000	126,000	540,000	11,592(3)	1,027,592
Andrew Ashe, J.D. *President and Chief Operating Officer*	2020	375,000	157,500	410,295	192(4)	942,987

(1) Except where noted otherwise, the amounts reported in the “Bonus” column reflect discretionary annual cash bonuses paid to our executive officers for their performance.

(2) The amounts reported in the “Option awards” column reflect the aggregate fair value of stock options awarded during the year computed in accordance with the provisions of Financial Accounting Standards Board, or FASB, Accounting Standards Codification, or ASC, Topic 718. See Note 12 to our consolidated financial statements appearing elsewhere in this prospectus regarding assumptions underlying the valuation of equity awards.

(3) Consists of $11,400 in 401(k) plan matching contributions and $192 in health and life insurance premiums.

(4) Consists of health and life insurance premiums.

Narrative to summary compensation table

Base salary. In 2020, we paid Dr. Kathiresan a base salary of $480,000, Dr. Bellinger a base salary of $350,000 and Mr. Ashe a base salary of $375,000.

We use base salaries to recognize the experience, skills, knowledge and responsibilities required of all our employees, including our named executive officers. None of our named executive officers is currently party to an employment agreement or other agreement or arrangement that provides for automatic or scheduled increases in base salary.

Annual bonus. Our board of directors may, in its discretion, award bonuses to our named executive officers from time to time. Our letter agreements with our named executive officers provide that they will be eligible for

annual performance-based bonuses up to a specified percentage of their salary (40% for Dr. Kathiresan, 30% for Dr. Bellinger and 35% for Mr. Ashe), subject to approval by our board of directors. Performance-based bonuses, which are calculated as a percentage of base salary, are designed to motivate our employees to achieve annual goals based on our strategic, financial and operating performance objectives. From time to time, our board of directors has approved discretionary annual cash bonuses to our named executive officers with respect to their prior year performance. The bonus for Dr. Kathiresean was guaranteed for the period beginning on his employment commencement date and ending on the one-year anniversary of July 24, 2019.

With respect to 2020, our board of directors awarded bonuses of $230,400, $126,000 and $157,500 to Dr. Kathiresan, Dr. Bellinger and Mr. Ashe, respectively.

Equity incentives. Although we do not have a formal policy with respect to the grant of equity incentive awards to our executive officers, or any formal equity ownership guidelines applicable to them, we believe that equity grants provide our executives with a strong link to our long-term performance, create an ownership culture and help to align the interests of our executives and our stockholders. In addition, we believe that equity grants with a time-based vesting feature promote executive retention because this feature incents our executive officers to remain in our employment during the vesting period. Accordingly, our board of directors periodically reviews the equity incentive compensation of our named executive officers and from time to time may grant equity incentive awards to them in the form of stock options.

In September 2020, we granted options to purchase 674,982, 215,994, and 164,113 shares of our common stock to Dr. Kathiresan, Dr. Bellinger and Mr. Ashe, respectively, at an exercise price per share of $2.87. These options vest as to 25% of the shares underlying the option on the first anniversary of the vesting commencement date and as to an additional 2.0833% of the original number of shares underlying the option monthly thereafter, subject to continued service.

Prior to this offering, our executive officers were eligible to participate in our 2018 Equity Incentive Plan, as amended, or the 2018 Plan. All stock options were granted pursuant to the 2018 Plan. We did not grant any restricted stock awards during 2020. Following this offering, our employees and executive officers will be eligible to receive stock options and other equity awards pursuant to our 2021 Stock Incentive Plan, or the 2021 Plan.

We have also agreed to grant to Dr. Kathiresan, Dr. Bellinger and Mr. Ashe options to purchase 53,998 shares of common stock, 21,599 shares of common stock and 21,599 shares of common stock, respectively, which we refer to as the IPO Grants. The IPO Grants will be granted pursuant to the 2021 Plan and will have an exercise price per share equal to the public offering price in this offering. The IPO Grants will be effective upon the commencement of trading of our common stock on the Nasdaq Stock Market and will vest as to 25% of the shares underlying the option on the first anniversary of the date of grant and as to an additional 2.0833% of the original number of shares underlying the option monthly thereafter, subject in each case to continued service.

We have used stock options to compensate our executive officers in the form of initial grants in connection with the commencement of employment. Prior to this offering, awards of stock options and restricted stock to our executive officers have been made by our board of directors. The options and restricted stock that we have granted to our executive officers are typically subject to time-based vesting, generally over four years following the vesting commencement date. Upon certain terminations of employment in connection with a change of control, vesting is fully accelerated; upon other involuntary terminations, 25% of the unvested portion of each grant will vest as of the date of the termination. Prior to the exercise of a stock option, the holder has no rights as a stockholder with respect to the shares subject to such option, including no voting rights and no right to receive dividends or dividend equivalents.

We have historically awarded stock options with exercise prices that are equal to the fair market value of our common stock on the date of grant as determined by our board of directors.

Outstanding equity awards at December 31, 2020

The following table sets forth information regarding all outstanding equity awards for each of our named executive officers as of December 31, 2020.

	Option Awards				Stock Awards	
Name	Number of securities underlying unexercised options (#) exercisable	Number of securities underlying unexercised options (#) unexercisable	Option exercise price ($)	Option expiration date	Number of shares of stock that have not vested (#)	Market value of shares of stock that have not vested ($)(1)
Sekar Kathiresan, M.D.	172,120	313,866(2)	$ 1.39	4/14/2029	128,008(3)	$ 2,432,152
	—	188,995(4)	$ 1.39	4/14/2029		
	—	674,982(5)	$ 2.87	9/15/2030		
Andrew Bellinger, M.D., Ph.D.	21,599	—(6)	$ 1.39	6/24/2029		
	12,599	30,599(7)	$ 1.48	9/16/2029		
	47,248	114,747(8)	$ 1.48	9/16/2029		
	—	215,994(9)	$ 2.87	9/15/2030		
Andrew Ashe, J.D.	106,673	64,004(10)	$ 1.39	11/7/2028		
	38,248	69,748(11)	$ 1.48	9/16/2029		
	—	164,113(12)	$ 2.87	9/15/2030		

(1) The market value of our common stock is based on the initial public offering price of $19.00 per share.

(2) This option to purchase 485,987 shares of our common stock vests over four years, with 25% of the shares having vested on July 22, 2020 and 2.0833% of the original number of shares vesting thereafter in equal monthly installments through July 22, 2023, subject to continued service.

(3) This restricted stock award for 512,032 shares vests over four years, in equal monthly installments through December 31, 2021, subject to continued service.

(4) This option to purchase 188,995 shares of our common stock vests over four years, with 25% of the shares vested on March 25, 2021 and 2.0833% of the original number of shares vesting thereafter in equal monthly installments through March 25, 2024, subject to continued service.

(5) This option to purchase 674,982 shares of our common stock vests over four years, with 25% of the shares vesting on September 16, 2021 and 2.0833% of the original number of shares vesting thereafter in equal monthly installments through September 16, 2024, subject to continued service.

(6) This option to purchase 21,599 shares of our common stock was fully vested as of May 1, 2020.

(7) This option to purchase 43,198 shares of our common stock vests over four years, with 25% of the shares having vested on October 1, 2020 and 2.0833% of the original number of shares vesting thereafter in equal monthly installments through October 1, 2023, subject to continued service.

(8) This option to purchase 161,995 shares of our common stock vests over four years, in equal monthly installments, through October 1, 2023, subject to continued service.

(9) This option to purchase 215,994 shares of our common stock vests over four years, with 25% of the shares vested on September 16, 2021 and 2.0833% of the original number of shares vesting thereafter in equal monthly installments through September 16, 2024, subject to continued service.

(10) This option to purchase 170,677 shares of our common stock vests over four years, with 10% of the shares having vested on August 20, 2018 and 1.875% of the original number of shares vesting thereafter in equal monthly installments through August 20, 2022, subject to continued service.

(11) This option to purchase 107,997 shares of our common stock vests over four years, in equal monthly installments, through July 26, 2023, subject to continued service.

(12) This option to purchase 164,113 shares of our common stock vests over four years, with 25% of the shares vesting on September 16, 2021 and 2.0833% of the original number of shares vesting thereafter in equal monthly installments through September 16, 2024, subject to continued service.

Employment agreements

Letter agreement with Sekar Kathiresan, M.D.

In connection with our initial hiring of Dr. Kathiresan as our chief executive officer, we entered into a letter agreement with him dated April 16, 2019. Dr. Kathiresan is an at-will employee, and his employment with us can be terminated by him or us at any time and for any reason. The letter agreement provides that Dr. Kathiresan is entitled to an annualized base salary of $480,000, subject to adjustment in accordance with normal business practices and at our sole discretion, during his employment with us and that he is eligible, at our sole discretion, to earn an annual bonus targeted at 40% of his base salary. The foregoing notwithstanding, such bonus was guaranteed for the period beginning on his employment commencement date (July 24, 2019) and ending on the one-year anniversary thereof. Dr. Kathiresan's letter agreement also provided that he was entitled to the grant of an option to purchase 485,987 shares, subject to a four-year vesting schedule, which option was granted in April 2019, and to an additional grant of an option to purchase 188,995 shares, subject to a four-year vesting schedule and conditioned on completion of our Series A financing, which option was granted in April 2019.

Under the letter agreement, Dr. Kathiresan is entitled, subject to his execution and nonrevocation of a release of claims in our favor, in the event of the termination of his employment by us without cause or by him for good reason, each as defined in his letter agreement with us, to (i) a lump sum payment equal to his full annual base salary and target bonus, (ii) our continuing to pay, for a period of 12 months, the share of the premiums for COBRA continuation coverage that we pay for active and similarly situated employees who receive the same type of coverage, provided he is eligible for and elects COBRA coverage and (iii) one year of additional vesting of any outstanding equity awards. The letter agreement also provides that in the event of a change in control, as defined in his letter agreement with us, all equity awards granted to Dr. Kathiresan shall vest in full.

Letter agreement with Andrew Bellinger, M.D., Ph.D.

In connection with our initial hiring of Dr. Bellinger as our chief scientific officer, we entered into a letter agreement with him dated July 26, 2019. Dr. Bellinger is an at-will employee, and his employment with us can be terminated by him or us at any time and for any reason. The letter agreement provides that Dr. Bellinger is entitled to an annualized base salary of $350,000, subject to adjustment in accordance with normal business practices and at our sole discretion, during his employment with us and that he is eligible, at our sole discretion, to earn an annual bonus targeted at 30% of his base salary. Dr. Bellinger's letter agreement also provided that he was entitled to the grant of an option to purchase 161,995 shares, subject to a four-year vesting schedule, which option was granted in September 2019, and to an additional grant of an option to purchase 43,198 shares, subject to a four-year vesting schedule, which option was granted in September 2019.

Under the letter agreement, Dr. Bellinger is entitled, subject to his execution and nonrevocation of a release of claims in our favor, in the event of the termination of his employment by us without cause or by him for good reason, each as defined in his letter agreement with us, to (i) a lump sum payment equal to two-thirds of his annual base salary and target bonus, (ii) our continuing to pay, for a period of nine months, the share of the premiums for COBRA continuation coverage that we pay for active and similarly situated employees who receive the same type of coverage, provided he is eligible for and elects COBRA coverage and (iii) nine months of additional vesting of any outstanding equity awards (but only if a stock option had commenced vesting (that is, had reached at least its first scheduled vesting date) on or prior to such termination date). The letter agreement also provides that in the event of a change in control, as defined in his letter agreement with us, all equity awards granted to Dr. Bellinger shall vest in full.

Letter agreement with Andrew Ashe, J.D.

On July 26, 2019, we entered into a letter agreement with Mr. Ashe. Mr. Ashe is an at-will employee, and his employment with us can be terminated by him or us at any time and for any reason. The letter agreement provides that Mr. Ashe is entitled to an annualized base salary of $375,000, subject to adjustment in accordance with normal business practices and at our sole discretion, during his employment with us and that he is eligible, at our sole discretion, to earn an annual bonus targeted at 35% of his base salary. Mr. Ashe's letter agreement also provided that he was entitled to the grant of an option to purchase 107,997 shares, subject to a four-year vesting schedule, which option was granted in September 2019.

Under the letter agreement, Mr. Ashe is entitled, subject to his execution and nonrevocation of a release of claims in our favor, in the event of the termination of his employment by us without cause or by him for good reason, each as defined in his letter agreement with us, to (i) a lump sum payment equal to his full annual base salary and target bonus, (ii) our continuing to pay, for a period of 12 months, the share of the premiums for COBRA continuation coverage that we pay for active and similarly situated employees who receive the same type of coverage, provided he is eligible for and elects COBRA coverage and (iii) one year of additional vesting of any outstanding equity awards (but only if a stock option had commenced vesting (that is, had reached at least its first scheduled vesting date) on or prior to such termination date). The letter agreement also provides that in the event of a change in control, as defined in his letter agreement with us, all equity awards granted to Mr. Ashe shall vest in full.

New employment agreements

We have entered into written employment agreements with each of our named executive officers, which became effective as of the effectiveness of the registration statement of which this prospectus forms a part and superseded the letter agreements described above and we intend to enter into employment agreements on substantially the same form with our other executive officers. These agreements set forth the terms of the named executive officer's compensation, including his base salary and annual performance bonus opportunity. In addition, the agreements provide that, subject to eligibility requirements under the plan documents governing such programs and our policies, the named executive officers are eligible to participate in company-sponsored benefit programs that are generally available to all of our similarly situated employees. Each named executive officer will also be eligible to receive equity awards, in addition to the IPO Grants, at such times and on such terms and conditions as our board of directors may determine.

Pursuant to their respective employment agreements, each of our named executive officers will be entitled to an annual base salary as follows: Sekar Kathiresan will be entitled to receive an annual base salary of $552,000 and Andrew Ashe and Andrew Bellinger will each be entitled to receive an annual base salary of $460,000. Each named executive officer's base salary will be reviewed by our board of directors, or a committee of our board of directors, on an annual or more frequent basis and is subject to increase, but not decrease, in the discretion of our board of directors or the committee.

Pursuant to their respective employment agreements, each of our named executive officers is also eligible to earn an annual discretionary bonus, with a target bonus amount equal to a specified percentage of such named executive officer's annual base salary, based upon periodic assessments of the named executive officer's performance as well as the achievement of specific individual and corporate objectives determined by our board of directors or a committee of our board of directors. Dr. Kathiresan will be eligible for an annual discretionary bonus targeted at 55% of his base salary. Mr. Ashe and Dr. Bellinger will each be eligible for an annual discretionary bonus targeted at 45% of his base salary. Each named executive officer's target bonus amount will be reviewed by our board of directors, or a committee of our board of directors, on an annual or more frequent basis and is subject to increase, but not decrease, in the discretion of our board of directors or the committee.

Potential payments upon termination or change in control

The employment agreements and the employment of each of Dr. Kathiresan, Mr. Ashe and Dr. Bellinger will provide that they may be terminated as follows: (1) upon the death or "disability" (as defined in the applicable employment agreement) of such executive officer; (2) at our election, with or without "cause" (as defined in the applicable employment agreement); and (3) at such executive officer's election, with or without "good reason" (as defined in the applicable employment agreement).

In the event of the termination of the employment of a named executive officer by us without cause, or by him for good reason, more than three months prior to or more than 12 months following a "change in control" (as such term is defined in his employment agreement), the named executive officer will be entitled to his base salary that has accrued and to which he is entitled as of the termination date and other accrued benefits, including, for Dr. Kathiresan, any bonus that has been earned but not yet paid, which we refer to collectively as the accrued obligations. In addition, subject to his execution and nonrevocation of a severance and release of claims agreement, or the severance agreement, in our favor and his continued compliance with his "confidentiality agreement" (as such term is defined in his employment agreement), the severance agreement and/or any similar agreement, as applicable, with us, the named executive officer is entitled to (1) continued payment of his base salary, in accordance with our regular payroll procedures, for a period of 12 months in the case of Dr. Kathiresan, 12 months in the case of Mr. Ashe and eight months in the case of Dr. Bellinger, (2) a lump sum payment equal to 100% in the case of Dr. Kathiresan, 100% in the case of Mr. Ashe and 67% in the case of Dr. Bellinger, of his target bonus for the year in which the termination occurs, (3) provided he is eligible for and timely elects to continue receiving group medical insurance under COBRA and the payments would not result in the violation of nondiscrimination requirements of applicable law, payment by us of the portion of health coverage premiums we pay for similarly situated, active employees who receive the same type of coverage, for a period of up to 12 months in the case of Dr. Kathiresan, 12 months in the case of Mr. Ashe and 9 months in the case of Dr. Bellinger following his date of termination and (4) immediate vesting and exercisability, or immediate release from our repurchase option, as applicable, of the number of shares subject to any unvested equity awards granted or issued to him, in the case of Dr. Kathiresan, prior to or following the effective date of his employment agreement and, in the case of Mr. Ashe and Dr. Bellinger, prior to the effective date of the employment agreement, that would have vested or been released, as applicable, had he remained an employee for 12 months in the case of Dr. Kathiresan, 12 months in the case of Mr. Ashe and nine months in the case of Dr. Bellinger, following his termination date (assuming no change in control occurred within such period). In addition, Dr. Kathiresan shall have until the earlier of 24 months following his termination date and the expiration of the applicable option grant to exercise all vested options then held by him (after giving effect to any vesting acceleration to which he is entitled).

In the event of the termination of the employment of a named executive officer by us without cause, or by him for good reason, within three months prior to or 12 months following a change in control, the named executive officer will be entitled to the accrued obligations. In addition, subject to his execution and nonrevocation of a severance and release of claims in our favor and his continued compliance with his confidentiality agreement, the severance agreement and/or any similar agreement, as applicable, with us, the named executive officer will be entitled to (1) a single lump sum payment equal to the sum of 18 months in the case of Dr. Kathiresan and 12 months in the case of each of Mr. Ashe and Dr. Bellinger of his then-current base salary, and 150% in the case of Dr. Kathiresan and 100% in the case of each of Mr. Ashe and Dr. Bellinger of his target bonus for the year in which the termination occurs or, if higher, his target bonus immediately prior to a change in control, (2) provided he is eligible for and timely elects to continue receiving group medical insurance under COBRA and the payments would not result in the violation of nondiscrimination requirements of applicable law, payment by us of the portion of health coverage premiums we pay for similarly situated, active employees who receive the same type of coverage, for a period of up to 18 months in the case of Dr. Kathiresan and 12 months in the case

of each of Mr. Ashe and Dr. Bellinger following his date of termination, and (3) full vesting acceleration of his then-unvested equity awards, such that all such then-unvested equity awards immediately vest and become fully exercisable or non-forfeitable as of the later of the date of the change in control and his termination date. Any shares underlying then-unvested equity awards granted or issued to the named executive officer prior to the effective date of his employment agreement shall become immediately vested, exercisable and non-forfeitable, as the case may be, upon a change in control. In addition, Dr. Kathiresan shall have until the earlier of 24 months following his termination date and the expiration of the applicable option grant to exercise all vested options then held by him (after giving effect to any vesting acceleration to which he is entitled).

If the named executive officer's employment is terminated for any other reason, including as a result of his death or disability, for cause, or voluntarily by the named executive officer without good reason, our obligations under the employment agreement cease immediately, and the named executive officer will only be entitled to the accrued obligations.

Employee non-competition, non-solicitation, confidentiality and assignment of inventions agreements

Each of our named executive officers has entered into a standard form agreement with respect to non-competition, non-solicitation, confidential information and assignment of inventions. Under this agreement, each of our named executive officers has agreed not to compete with us during his employment and for a period of one year after the termination of his employment, not to solicit our employees, consultants, customers, business or prospective customers during his employment and for a period of one year after the termination of his employment, and to protect our confidential and proprietary information indefinitely. In addition, under this agreement, each named executive officer has agreed that we own all inventions that are developed by such executive officer during his employment with us that (i) are related to our business or our customers or suppliers or any of our products or services being researched, developed, manufactured or sold by us or which may be used with such products or services, (ii) result from tasks assigned to the executive officer by us or (iii) result from the use of our premises or personal property (whether tangible or intangible) owned, leased or contracted for by us.

Stock option and other compensation plans

In this section we describe our 2018 Plan, our 2021 Plan and our Amended and Restated 2021 Employee Stock Purchase Plan, or the 2021 ESPP. Prior to this offering, we granted awards to eligible participants under the 2018 Plan. Following the effectiveness of the 2021 Plan, no additional awards will be granted under the 2018 Plan and we expect to grant awards to eligible participants from time to time only under the 2021 Plan.

2018 Equity incentive plan

Our 2018 Plan was initially approved by our board of directors and stockholders on August 6, 2018 and subsequently amended on April 10, 2020, July 22, 2020 and January 13, 2021, solely to increase the number of shares available for issuance under the 2018 Plan. Our 2018 Plan allows us to provide incentive stock options, within the meaning of Section 422 of the U.S. Internal Revenue Code of 1986, as amended, which we refer to as the Code, nonstatutory stock options, stock appreciation rights, restricted stock awards and restricted stock units, each of which we refer to as an award and the recipient of such award, a participant. Eligible employees, directors and consultants, including employees and consultants of any of our parent or subsidiary companies, are eligible to receive awards under the 2018 Plan; however, incentive stock options may only be granted to our or our subsidiaries' employees.

Subject to adjustment in the event of certain changes in our capitalization (as described below), the maximum number of shares of common stock authorized for issuance under our 2018 Plan is 6,885,653 shares, all of which may be issued as incentive stock options. As of May 31, 2021, stock options to purchase 5,258,661 shares of our common stock were outstanding under our 2018 Plan and there were no stock appreciation rights,

restricted stock awards or restricted stock units outstanding under our 2018 Plan. No further awards will be made under the 2018 Plan on or after the effective date of the 2021 Plan described below; however, awards outstanding under the 2018 Plan will continue to be governed by their existing terms.

Different committees may administer our 2018 Plan with respect to different groups of service providers. Otherwise, the 2018 Plan is administered by our board of directors or by a committee of our board of directors or of other individuals satisfying applicable laws appointed by the board or by a duly authorized compensation committee of the board. Subject to the provisions of the 2018 Plan, and in the case of a committee, subject to the specific duties delegated by our board of directors to the committee, the administrator of the 2018 Plan has the authority to construe and interpret the terms of our 2018 Plan and the awards granted under our 2018 Plan, prescribe, amend and rescind rules and regulations relating to our 2018 Plan, including rules and regulations relating to sub-plans established for the purpose of satisfying applicable foreign laws or for qualifying for favorable tax treatment under applicable foreign laws, and make all other determinations deemed necessary or advisable for administering the 2018 Plan. The administrator's decisions, determinations and interpretations are final and binding on all participants and any other persons holding awards.

The administrator of the 2018 Plan selects the recipients of awards and, among other things, determines:

- the number of shares of our common stock covered by each award granted under the 2018 Plan;
- the terms and conditions, not inconsistent with the terms of the 2018 Plan, of any award granted under the 2018 Plan, which terms and conditions include, but are not limited to, the exercise price, which, in the case of options, may not be less than the fair market value of a share of common stock on the date of grant, the time or times when awards may be exercised (which may be based on performance criteria), any vesting acceleration or waiver of forfeiture restrictions, and any restriction or limitation regarding an award or the shares of common stock relating to the award, based in each case on the factors the administrator determines;
- the duration of options, which may not be in excess of ten years; and
- the forms of consideration for exercising options, including the method of payment.

Unless determined otherwise by the administrator, awards may not be sold, pledged, assigned, hypothecated or otherwise transferred in any manner other than by will or by the laws of descent and distribution. In addition, during an applicable participant's lifetime, only that participant may exercise his or her award. If the administrator makes an award transferable, such award may only be transferred (i) by will, (ii) by the laws of descent and distribution or (iii) as permitted by Rule 701 of the Securities Act of 1933, as amended, or the Securities Act.

Certain adjustments

If there is a dividend or other distribution (whether in the form of cash, shares of our common stock, other securities or other property), recapitalization, stock split, reverse stock split, reorganization, merger, consolidation, split-up, spin-off, combination, repurchase, exchange of shares of common stock or our other securities or other change in our corporate structure affecting the shares of our common stock, the administrator, in order to prevent diminution or enlargement of the benefits or potential benefits intended to be made available under the 2018 Plan will adjust the number and class of shares that may be delivered under our 2018 Plan and/or the number, class and price of shares of stock covered by each outstanding award.

Dissolution or liquidation

In the event of our proposed dissolution or liquidation, the administrator will notify each participant as soon as practicable prior to the effective date of such proposed transaction. To the extent it has not been previously exercised, an award will terminate immediately prior to the consummation of such proposed action.

Merger and change in control

In the event of our merger with or into another corporation or entity or a "change in control" (as defined in our 2018 Plan), each outstanding award will be treated as the administrator determines without a participant's consent, including, without limitation, that (i) awards will be assumed, or substantially equivalent awards will be substituted, by the acquiring or succeeding corporation (or its affiliate) with appropriate adjustments as to the number and kind of shares and prices; (ii) upon written notice to a participant, the participant's awards will terminate upon or immediately prior to the consummation of such 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, to the extent the administrator determines, terminate upon or immediately prior to the effectiveness of such merger or change in control; (iv) (1) the termination of an award in exchange for an amount of cash and/or property, if any, equal to the amount 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 (and, for the avoidance of doubt, if as of the date of the occurrence of the transaction the administrator determines in good faith that no amount would have been attained upon the exercise of such award or realization of the participant's rights, then such award may be terminated by us without payment) or (2) the replacement of such award with other rights or property selected by the administrator in its sole discretion; or (v) any combination of the foregoing. The administrator is not be obligated to treat all awards, all awards a participant holds or all awards of the same type, similarly. Notwithstanding the foregoing, if a payment under an award agreement is subject to Section 409A of the Code and if the definition of change in control contained in the applicable award agreement does not comply with the definition of "change of control" for purposes of a distribution under Section 409A of the Code, then any payment of an amount that is otherwise accelerated pursuant to this paragraph will be delayed until the earliest time that payment would be permissible under Section 409A of the Code without triggering any penalties applicable under Section 409A of the Code.

Amendment and termination

The administrator has the authority to modify or amend any award, subject to obtaining the participant's agreement to such modification or amendment if the modification or amendment would impair the rights of the participant. Our board of directors may, at any time, amend, alter, suspend or terminate our 2018 Plan. To the extent necessary and desirable to comply with applicable laws (including any applicable stock exchange rules), we will obtain stockholder approval of any amendment to our 2018 Plan. No amendment, alteration, suspension or termination of our 2018 Plan will impair the rights of a participant, unless mutually agreed otherwise between the participant and the administrator in writing.

2021 Stock incentive plan

In June 2021, our board of directors adopted and our stockholders approved the 2021 Plan, which became effective immediately prior to the effectiveness of the registration statement of which this prospectus is a part. The 2021 Plan provides for the grant of incentive stock options, nonstatutory stock options, stock appreciation rights, awards of restricted stock, restricted stock units and other stock-based awards. The number of shares of our common stock reserved for issuance under the 2021 Plan is the sum of: (1) 3,466,530; plus (2) the number of shares as is equal to the sum of (x) the number of shares of our common stock reserved for issuance under

the 2018 Plan that remained available for grant under the 2018 Plan immediately prior to the effectiveness of the registration statement for this offering and (y) the number of shares of our common stock subject to outstanding awards granted under the 2018 Plan that expire, terminate or are otherwise surrendered, cancelled, forfeited or repurchased by us at their original issuance price pursuant to a contractual repurchase right; plus (3) an annual increase, to be added on the first day of each fiscal year, commencing on January 1, 2022 and continuing until, and including, January 1, 2031, equal to the lesser of (i) 5% of the number of shares of our common stock outstanding on such date and (ii) the number of shares of our common stock determined by our board of directors. Subject to adjustment in the event of certain changes in our capitalization, up to 6,933,061 of the shares of our common stock available for issuance under the 2021 Plan may be issued as incentive stock options.

Our employees, officers, directors, consultants and advisors will be eligible to receive awards under the 2021 Plan; however, incentive stock options may only be granted to our employees. In addition to the IPO Grants, we have agreed to grant stock options to purchase an aggregate of 319,659 shares of our common stock to certain of our employees and an aggregate of 47,664 shares of our common stock to certain of our non-employee directors pursuant to our director compensation program. See "—Director compensation."

Pursuant to the terms of the 2021 Plan, our board of directors (or a committee delegated by our board of directors) will administer the 2021 Plan and, subject to any limitations set forth in the 2021 Plan, will select the recipients of awards and determine:

- the number of shares of our common stock covered by options and the dates upon which the options become exercisable;
- the type of options to be granted;
- the duration of options, which may not be in excess of ten years;
- the exercise price of options, which must be at least equal to the fair market value of our common stock on the date of grant;
- the methods of payment of the exercise price of options; and
- the number of shares of our common stock subject to and the terms and conditions of any stock appreciation rights, awards of restricted stock, restricted stock units or other stock-based awards, including conditions for repurchase, measurement price, issue price and repurchase price (though the measurement price of stock appreciation rights must be at least equal to the fair market value of our common stock on the date of grant and the duration of such awards may not be in excess of ten years) and any performance conditions.

If our board of directors delegates authority to one or more of our officers to grant awards under the 2021 Plan, the officers will have the power to make awards to all of our employees, except officers and executive officers (as such terms are defined in the 2021 Plan). Our board of directors will fix the terms of the awards to be granted by any such officer, the maximum number of shares subject to awards that any such officer may grant, and the time period in which such awards may be granted.

The 2021 Plan contains limits on compensation that may be paid to our non-employee directors. The maximum aggregate amount of cash and value (calculated based on grant date fair value for financial reporting purposes) of awards under the 2021 Plan granted in any calendar year to any individual non-employee director in his or her capacity as a non-employee director may not exceed $750,000, or $1,000,000 in the case of a non-employee director during his or her first year of service. Fees paid by us on behalf of any non-employee director in connection with regulatory compliance and any amounts paid to a non-employee director as

reimbursement of an expense will not count against this limit. Our board of directors may make additional exceptions to this limit for individual non-employee directors in extraordinary circumstances, provided that the non-employee director receiving such additional compensation may not participate in the decision to award such compensation. The limitation does not apply to cash or awards granted to a non-employee director in his or her capacity as a consultant or advisor to us.

Effect of certain changes in capitalization

In the event of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spin-off or other similar change in capitalization or event, or any dividend or distribution to holders of our common stock other than an ordinary cash dividend, we are required by the 2021 Plan to make equitable adjustments (or make substitute awards, if applicable), in the manner determined by our board of directors, to:

- the number and class of securities available under the 2021 Plan, and the number and class of securities available for issuance under the 2021 Plan that may be issued as incentive stock options;
- the share counting rules of the 2021 Plan;
- the number and class of securities and exercise price per share of each outstanding option;
- the share and per-share provisions and the measurement price of each outstanding stock appreciation right;
- the number of shares and the repurchase price per share subject to each outstanding award of restricted stock; and
- the share and per-share related provisions and purchase price, if any, of each outstanding restricted stock unit award and each outstanding other stock-based award.

Effect of certain corporate transactions

Upon the occurrence of a merger or other reorganization event (as defined in the 2021 Plan), our board of directors may, on such terms as our board of directors determines (except to the extent specifically provided otherwise in an applicable award agreement or other agreement between the participant and us), take any one or more of the following actions pursuant to the 2021 Plan as to all or any (or any portion of) outstanding awards, other than awards of restricted stock:

- provide that outstanding awards will be assumed, or substantially equivalent awards will be substituted, by the acquiring or succeeding corporation (or an affiliate of the acquiring or succeeding corporation);
- upon written notice to a participant, provide that all of the participant's unvested awards will be forfeited immediately prior to the consummation of the reorganization event and/or that all of the participant's vested but unexercised awards will terminate immediately prior to the consummation of such transaction unless exercised, to the extent exercisable, by the participant within a specified period following the date of such notice;
- provide that outstanding awards will become exercisable, realizable or deliverable, or restrictions applicable to an award will lapse, in whole or in part, prior to or upon the reorganization event;
- in the event of a reorganization event pursuant to which holders of our common stock will receive a cash payment for each share surrendered in the reorganization event, make or provide for a cash payment to

participants with respect to each award held by a participant equal to (1) the number of shares of our common stock subject to the vested portion of the award (after giving effect to any acceleration of vesting that occurs upon or immediately prior to such reorganization event) multiplied by (2) the excess, if any, of the cash payment for each share surrendered in the reorganization event over the exercise, measurement or purchase price of such award and any applicable tax withholdings, in exchange for the termination of such award;

- provide that, in connection with our liquidation or dissolution, awards will convert into the right to receive liquidation proceeds (if applicable, net of the exercise, measurement or purchase price thereof and any applicable tax withholdings); or
- any combination of the foregoing.

Our board of directors is not obligated by the 2021 Plan to treat all awards, all awards held by a participant, or all awards of the same type, identically.

In the case of certain restricted stock units, no assumption or substitution is permitted, and the restricted stock units will instead be settled in accordance with the terms of the applicable restricted stock unit agreement.

Upon the occurrence of a reorganization event other than our liquidation or dissolution, our repurchase and other rights with respect to outstanding awards of restricted stock will continue for the benefit of the succeeding company and will, unless our board of directors determines otherwise, apply to the cash, securities or other property which our common stock is converted into or exchanged for pursuant to the reorganization event in the same manner and to the same extent as they applied to the common stock subject to the restricted stock award. However, our board of directors may provide for the termination or deemed satisfaction of such repurchase or other rights under the restricted stock award agreement or any other agreement between a participant and us, either initially or by amendment. Upon the occurrence of a reorganization event involving our liquidation or dissolution, all restrictions and conditions on each outstanding restricted stock award will automatically be deemed terminated or satisfied, unless otherwise provided in the agreement evidencing the restricted stock award or in any other agreement between the participant and us.

Our board of directors may, at any time, provide that any award under the 2021 Plan will become immediately exercisable in whole or in part, free of some or all restrictions or conditions, or otherwise realizable in whole or in part, as the case may be.

Except with respect to certain actions requiring stockholder approval under the e Code, or Nasdaq rules, our board of directors may amend, modify or terminate any outstanding award under the 2021 Plan, including but not limited to, substituting for the award another award of the same or a different type, changing the date of exercise or realization, and converting an incentive stock option to a nonstatutory stock option, subject to certain participant consent requirements. However, unless our stockholders approve such action, the 2021 Plan provides that we may not (except as otherwise permitted in connection with a change in capitalization or reorganization event):

- amend any outstanding stock option or stock appreciation right granted under the 2021 Plan to provide an exercise or measurement price per share that is lower than the then-current exercise or measurement price per share of such outstanding award;
- cancel any outstanding stock option or stock appreciation right (whether or not granted under the 2021 Plan) and grant a new award under the 2021 Plan in substitution for the canceled award (other than substitute awards permitted in connection with a merger or consolidation of an entity with us or our acquisition of property or stock of another entity) covering the same or a different number of shares of our common stock

and having an exercise or measurement price per share lower than the then-current exercise or measurement price per share of the canceled award;

- cancel in exchange for a cash payment any outstanding option or stock appreciation right with an exercise or measurement price per share above the then-current fair market value of our common stock (valued in the manner determined by (or in the manner approved by) our board of directors); or
- take any other action that constitutes a “repricing” within the meaning of Nasdaq rules or the rules of any other exchange or marketplace on which our common stock is listed or traded.

No award may be granted under the 2021 Plan on or after the date that is ten years from the effectiveness of the registration statement of which this prospectus is a part. Our board of directors may amend, suspend or terminate the 2021 Plan at any time, except that stockholder approval will be required to comply with applicable law or stock market requirements.

Amended and Restated 2021 Employee stock purchase plan

In June 2021, our board of directors adopted and our stockholders approved the 2021 employee stock purchase plan. The 2021 employee stock purchase plan was subsequently amended and restated by our board of directors to permit the board, or a committee appointed by our board of directors, to establish a maximum number of shares that may be purchased by a participant in any offering period. We refer to the amended and restated 2021 employee stock purchase plan as the 2021 ESPP. The 2021 ESPP became effective immediately prior to the effectiveness of the registration statement of which this prospectus is a part. The 2021 ESPP is administered by our board of directors or by a committee appointed by our board of directors. The 2021 ESPP initially provides participating employees with the opportunity to purchase up to an aggregate of 433,316 shares of our common stock. The number of shares of our common stock reserved for issuance under the 2021 ESPP will automatically increase on the first day of each fiscal year, commencing on January 1, 2022 and continuing for each fiscal year until, and including, January 1, 2031, in an amount equal to the lowest of (1) 1,083,290 shares of our common stock, (2) 1% of the number of shares of our common stock outstanding on such date and (3) an amount determined by our board of directors.

All of our employees and employees of any designated subsidiary, as defined in the 2021 ESPP, are eligible to participate in the 2021 ESPP, provided that:

- such person is customarily employed by us or a designated subsidiary for more than 20 hours a week and for more than five months in a calendar year;
- such person has been employed by us or by a designated subsidiary for at least one month prior to enrolling in the 2021 ESPP; and
- such person was our employee or an employee of a designated subsidiary on the first day of the applicable offering period under the 2021 ESPP.

We retain the discretion to determine which eligible employees may participate in an offering under applicable regulations.

The first offering to our eligible employees to purchase stock under the 2021 ESPP, which we refer to as the first offering period, will begin on the effective date of the registration statement for this offering and shall end on December 13, 2021. We expect the second offering to our eligible employees to purchase stock under the 2021 ESPP, which we refer to as the second offering period, to begin on December 14, 2021 and end on May 31, 2022. Thereafter, we expect to begin offerings to our eligible employees to purchase stock under the 2021 ESPP on each June 1 and December 1 (or the next following business day). Each offering, other than the second offering

period, is expected to consist of a six-month offering period during which payroll deductions will be made and held for the purchase of our common stock at the end of the offering period. Our board of directors may, at its discretion, choose a different period of not more than 12 months for offerings.

On each offering commencement date, each participant will be granted an option to purchase, on the last business day of the offering period, up to a number of shares of our common stock determined by multiplying $2,083 by the number of full months in the offering period and dividing that product by the initial public offering price, in the case of the first offering period, and by the closing price of our common stock on the first day of the offering period. No employee may be granted an option under the 2021 ESPP that permits the employee's rights to purchase shares under the 2021 ESPP and any other employee stock purchase plan of ours or of any of our subsidiaries to accrue at a rate that exceeds $25,000 of the fair market value of our common stock (determined as of the first day of each offering period) for each calendar year in which the option is outstanding. Our board of directors, or a committee appointed by our board of directors, may in its discretion, set a fixed maximum number of shares of common stock that each eligible employee may purchase in any offering period, instead of the number of shares of common stock determined using the formula described above, provided that such fixed maximum number is subject to the $25,000 limitation described above. In addition, no employee may purchase shares of our common stock under the 2021 ESPP that would result in the employee owning 5% or more of the total combined voting power or value of our stock or the stock of any of our subsidiaries.

Except with respect to the first offering period, on the commencement date of each offering period, each eligible employee may authorize up to a maximum of 15% of his or her compensation to be deducted by us during the offering period. Each employee who continues to be a participant in the 2021 ESPP on the last business day of the offering period will be deemed to have exercised an option to purchase from us the number of whole shares of our common stock that his or her accumulated payroll deductions on such date will pay for, not in excess of the maximum numbers set forth above. Under the terms of the 2021 ESPP, the purchase price will be determined by our board of directors or the committee for each offering period and will be at least 85% of the applicable closing price of our common stock. If our board of directors or the committee does not make a determination of the purchase price, the purchase price will be 85% of the lesser of the closing price of our common stock on the first business day of the offering period or on the last business day of the offering period.

Each of our eligible employees will be automatically enrolled in the 2021 ESPP for the first offering period and will be deemed to participate in the 2021 ESPP at a rate of 15% of his or her compensation. Payroll deductions are not required for the first offering period; however, a participant may, at any time after the effectiveness of the registration statement on Form S-8 registering shares of common stock reserved for issuance under the 2021 ESPP, which we intend to file after effectiveness of the registration statement of which this prospectus forms a part, elect to have payroll deductions up to the aggregate amount that would have been credited to his or her account if a deduction of 15% of the compensation that he or she received on each pay day during the first offering period had been made or decline to participate by completing an appropriate enrollment form. Upon the automatic exercise of a participant's option on the last day of the first offering period, a participant shall be permitted to purchase shares with (i) the accumulated payroll deductions in his or her account, if any, (ii) a direct payment by check from the participant, or (iii) a combination thereof; provided, however, that the total amount applied to the purchase may not exceed the maximum amount described in the preceding sentence.

An employee may at any time prior to the close of business on the fifteenth business day prior to the end of an offering period (or such other number of days as is determined by us), and for any reason, permanently withdraw from participating in an offering and permanently withdraw the balance accumulated in the employee's account. Partial withdrawals are not permitted. If an employee elects to discontinue his or her payroll deductions during an offering period but does not elect to withdraw his or her funds, funds previously

deducted will be applied to the purchase of common stock at the end of the offering period. If a participating employee's employment ends before the last business day of an offering period such that the employee is no longer employed by us or any designated subsidiary of ours, no additional payroll deductions will be taken and the balance in the employee's account will be paid to the employee.

We will be required to make equitable adjustments to the extent determined by our board of directors or a committee thereof to the number and class of securities available under the 2021 ESPP, the share limitations under the 2021 ESPP, and the purchase price for an offering period under the 2021 ESPP to reflect stock splits, reverse stock splits, stock dividends, recapitalizations, combinations of shares, reclassifications of shares, spin-offs and other similar changes in capitalization or events or any dividends or distributions to holders of our common stock other than ordinary cash dividends.

In connection with a merger or other reorganization event, as defined in the 2021 ESPP, our board of directors or a committee of our board of directors may take any one or more of the following actions as to outstanding options to purchase shares of our common stock under the 2021 ESPP on such terms as our board of directors or committee thereof determines:

- provide that options will be assumed, or substantially equivalent options will be substituted, by the acquiring or succeeding corporation (or an affiliate of the acquiring or succeeding corporation);
- upon written notice to employees, provide that all outstanding options will be terminated immediately prior to the consummation of such reorganization event and that all such outstanding options will become exercisable to the extent of accumulated payroll deductions as of a date specified by our board of directors or committee thereof in such notice, which date will not be less than ten days preceding the effective date of the reorganization event (or such other number of days as is determined by our board of directors or a committee of our board of directors);
- upon written notice to employees, provide that all outstanding options will be canceled as of a date prior to the effective date of the reorganization event and that all accumulated payroll deductions will be returned to participating employees on such date;
- in the event of a reorganization event under the terms of which holders of our common stock will receive upon consummation thereof a cash payment for each share surrendered in the reorganization event, change the last day of the offering period to be the date of the consummation of the reorganization event and make or provide for a cash payment to each employee equal to (1) the cash payment for each share surrendered in the reorganization event times the number of shares of our common stock that the employee's accumulated payroll deductions as of immediately prior to the reorganization event could purchase at the applicable purchase price, where the cash payment for each share surrendered in the reorganization event is treated as the fair market value of our common stock on the last day of the applicable offering period for purposes of determining the purchase price and where the number of shares that could be purchased is subject to the applicable limitations under the 2021 ESPP minus (2) the result of multiplying such number of shares by the purchase price; and/or
- provide that, in connection with our liquidation or dissolution, options will convert into the right to receive liquidation proceeds (net of the purchase price thereof).

Our board of directors may at any time, and from time to time, amend or suspend the 2021 ESPP or any portion of the 2021 ESPP. We will obtain stockholder approval for any amendment if such approval is required by Section 423 of the Code. Further, our board of directors may not make any amendment that would cause the 2021 ESPP to fail to comply with Section 423 of the Code. The 2021 ESPP may be terminated at any time by our board of directors. Upon termination, we will refund all amounts in the accounts of participating employees.

Health/welfare plans

All of our full-time employees, including our named executive officers, are eligible to participate in our health and welfare plans, including medical and dental benefits, short-term and long-term disability insurance, and life insurance. We believe these benefits are necessary and appropriate to provide a competitive compensation package to our named executive officers.

401(k) Plan

We maintain a defined contribution employee retirement plan for our employees, including our named executive officers. The plan is intended to qualify as a tax-qualified 401(k) plan so that contributions to the 401(k) plan, and income earned on such contributions, are not taxable to participants until withdrawn or distributed from the 401(k) plan (except in the case of contributions under the 401(k) plan designated as Roth contributions). Under the 401(k) plan, each employee is fully vested in his or her deferred salary contributions and our discretionary match. Employee contributions are held and invested by the plan's trustee as directed by participants. The 401(k) plan provides us with the discretion to match employee contributions, but to date we have not provided any employer matching contributions.

Limitation of liability and indemnification

Our certificate of incorporation that will become effective upon the closing of this offering limits the personal liability of directors for breach of fiduciary duty to the maximum extent permitted by the Delaware General Corporation Law, or the DGCL, and provides that no director will have personal liability to us or to our stockholders for monetary damages for breach of fiduciary duty as a director. However, these provisions do not eliminate or limit the liability of any of our directors:

- for any breach of the director's duty of loyalty to us or our stockholders;
- for acts or omissions not in good faith or that involve intentional misconduct or a knowing violation of law;
- for voting for or assenting to unlawful payments of dividends, stock repurchases or other distributions; or
- for any transaction from which the director derived an improper personal benefit.

Any amendment to or repeal of these provisions will not eliminate or reduce the effect of these provisions in respect of any act, omission or claim that occurred or arose prior to such amendment or repeal. If the DGCL is amended to provide for further limitations on the personal liability of directors of corporations, then the personal liability of our directors will be further limited to the greatest extent permitted by the DGCL.

In addition, our certificate of incorporation that will become effective upon the closing of this offering provides that we must indemnify our directors and officers and we must advance expenses, including attorneys' fees, to our directors and officers in connection with legal proceedings, subject to very limited exceptions.

We maintain a general liability insurance policy that covers specified liabilities of our directors and officers arising out of claims based on acts or omissions in their capacities as directors or officers. In addition, we have entered into indemnification agreements with all of our executive officers and directors. These indemnification agreements require us, among other things, to indemnify each such executive officer or director for some expenses, including attorneys' fees, judgments, fines and settlement amounts incurred by him or her in any action or proceeding arising out of his or her service as one of our executive officers or directors.

Some of our non-employee directors may, through their relationships with their employers, be insured or indemnified against specified liabilities incurred in their capacities as members of our board of directors.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, executive officers or persons controlling us, in the opinion of the SEC, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

Rule 10b5-1 sales plans

Our directors and executive officers may adopt written plans, known as Rule 10b5-1 plans, in which they will contract with a broker to buy or sell shares of our common stock on a periodic basis. Under a Rule 10b5-1 plan, a broker executes trades pursuant to parameters established by the director or officer when entering into the plan, without further direction from the director or officer. It also is possible that the director or officer could amend or terminate the plan when not in possession of material, nonpublic information. In addition, our directors and executive officers may buy or sell additional shares outside of a Rule 10b5-1 plan when they are not in possession of material, nonpublic information.

Director compensation

The table below shows all compensation to our non-employee directors during the year ended December 31, 2020. Mr. MacLean and Ms. Mikhail joined our board of directors in 2021 and accordingly did not receive compensation from us in 2020.

Name	Fees earned or paid in cash ($)	Option awards($)(1)(2)	All other compensation($)	Total ($)
Burt Adelman, M.D.	—	—	60,000(3)	60,000
John Evans	25,000	53,246	—	78,246
Anthony Philippakis, M.D., Ph.D.(4)	—	—	—	—
Krishna Yeshwant, M.D.	—	—	—	—

(1) The amounts reported represent the aggregate grant date fair value of stock options awarded in 2020, calculated in accordance with FASB ASC Topic 718. The assumptions used in calculating the grant date fair value are set forth in Note 12 to our consolidated financial statements appearing elsewhere in this prospectus. These amounts reflect the accounting cost for these stock options and do not reflect the actual economic value that may be realized by the directors upon the vesting of the stock options, the exercise of the stock options or the sale of the common underlying such stock options.

(2) As of December 31, 2020, the aggregate number of stock options held by non-employee directors was as follows:

Director	Aggregate number of option awards
Burt Adelman, M.D.	—
John Evans	21,599
Anthony Philippakis, M.D., Ph.D.	—
Krishna Yeshwant, M.D.	—

(3) Represents consulting fees paid to Dr. Adelman in connection with his consulting arrangement.

(4) Dr. Philippakis resigned as a member of our board of directors in May 2021.

Prior to this offering, we paid cash fees and granted equity awards to certain of our non-employee directors for their service on our board of directors pursuant to a non-employee director compensation policy adopted in April 2021. Each non-employee director not affiliated with GV received an annual fee of $50,000 relating to such director's service on the board of directors, and the chairperson of the board received an additional annual fee of $10,000. In connection with his or her initial election to the board of directors and upon approval of the board, each such director also received an option under our 2018 Plan to purchase 43,198 shares of common stock, which option vests quarterly over four years in equal installments, subject to continued service. Prior to April 2021, we compensated Burt Adelman, M.D., the chairman of our board of directors and one of our

co-founders, pursuant to a consulting agreement dated August 7, 2018. The consulting agreement, which was terminated in April 2021, entitled Dr. Adelman to consulting fees of $15,000 per calendar quarter. We have historically reimbursed our non-employee directors for reasonable travel and out-of-pocket expenses incurred in connection with attending board of director and committee meetings.

Dr. Kathiresan, one of our directors who also serves as our chief executive officer, does not receive any additional compensation for his service as a director. Dr. Kathiresan is one of our named executive officers and, accordingly, the compensation that we pay to Dr. Kathiresan is discussed above under "—Summary compensation table" and "—Narrative to summary compensation table."

In June 2021, our board of directors approved a director compensation program that became effective on the effective date of the registration statement of which this prospectus is a part. Under this director compensation program, we will pay our non-employee directors a cash retainer for service on the board of directors and for service on each committee on which the director is a member. The chairperson of the board and of each committee will receive higher retainers for such service. These fees are payable in arrears in four equal quarterly installments on the last day of each quarter, provided that the amount of such payment will be prorated for any portion of such quarter that the director is not serving on our board of directors and no fee will be payable in respect of any period prior to the completion of this offering. The fees paid to non-employee directors for service on the board of directors and for service on each committee of the board of directors on which the director is a member are as follows:

	Member annual fee	Chairperson incremental annual fee
Board of Directors	$35,000	$30,000
Audit Committee	$ 7,500	$ 7,500
Compensation Committee	$ 5,000	$ 5,000
Nominating and Corporate Governance Committee	$ 4,000	$ 4,000

We also will continue to reimburse our non-employee directors for reasonable travel and other expenses incurred in connection with attending meetings of our board of directors and any committee of our board of directors on which they serve.

In addition, under our director compensation program that became effective on the effective date of the registration statement of which this prospectus is a part, each non-employee director will receive, upon his or her initial election or appointment to our board of directors, an option to purchase 47,664 shares of our common stock under the 2021 Plan. Each of these options will vest as to 2.7778% of the shares of our common stock underlying such option at the end of each successive one month period following the grant date until the third anniversary of the grant date, subject to the non-employee director's continued service as a director. Further, on the date of the first board meeting held after each annual meeting of stockholders, each non-employee director that has served on our board of directors for at least six months will receive, under the 2021 Plan, an option to purchase 25,999 shares of our common stock under the 2021 Plan. Each of these options will vest with respect to all of the shares underlying such option on the first anniversary of the grant date or, if earlier, immediately prior to the first annual meeting of stockholders occurring after the grant date, subject to the non-employee director's continued service as a director. All options issued to our non-employee directors under our director compensation program will be issued at exercise prices equal to the fair market value of our common stock on the date of grant and will become exercisable in full upon specified change in control events.

Transactions with related persons

Since January 1, 2018, we have engaged in the following transactions in which the amounts involved exceeded $120,000 and any of our directors, executive officers or holders of more than 5% of our voting securities, or any member of the immediate family of, or person sharing the household with, the foregoing persons, had or will have a direct or indirect material interest. We believe that all of these transactions were on terms as favorable as could have been obtained from unrelated third parties.

Series A preferred stock financing

In August 2018, we issued an aggregate of 16,722,408 shares of our Series A preferred stock at a price per share of $0.5980 in cash, for an aggregate purchase price of $10.0 million. The following table sets forth the aggregate number of shares of our Series A preferred stock that we issued to our directors, officers and 5% stockholders and their affiliates and the aggregate amount of consideration for such shares:

Purchaser	Number of shares of Series A preferred stock	Cash purchase price
GV 2017, L.P.(1)(2)	11,705,686	$ 7,000,000
Biomatics Capital Partners, L.P.	2,842,809	1,700,000
Beam Therapeutics Inc.(3)	501,672	300,000

(1) Krishna Yeshwant, a member of our board of directors, is a managing partner of GV.

(2) Anthony Philippakis, a former member of our board of directors, is a venture partner of GV.

(3) John Evans, a member of our board of directors, is the chief executive officer and a member of the board of directors of Beam Therapeutics Inc.

In December 2018, we issued an aggregate of 2,842,809 shares of our Series A preferred stock at a price per share of $0.5980 in cash, for an aggregate purchase price of $1.7 million. All of these shares were sold to entities affiliated with ARCH Venture Partners, a 5% stockholder. John Evans, a member of our board of directors, was a venture partner of ARCH Venture Partners from April 2017 to March 2021.

In August 2019, we issued an aggregate of 29,347,825 shares of our Series A preferred stock at a price per share of $0.5980 in cash, for an aggregate purchase price of $17.5 million. The following table sets forth the aggregate number of shares of our Series A preferred stock that we issued to our directors, officers and 5% stockholders and their affiliates and the aggregate amount of consideration for such shares:

Purchaser	Number of shares of Series A preferred stock	Cash purchase price
GV 2017, L.P.(1)(2)	17,558,528	$10,500,000
Entities affiliated with ARCH Venture Partners(3)	4,264,214	2,550,000
Biomatics Capital Partners, L.P.	4,264,214	2,550,000
Beam Therapeutics Inc.(4)	752,508	450,000

(1) Krishna Yeshwant, a member of our board of directors, is a managing partner of GV.

(2) Anthony Philippakis, a former member of our board of directors, is a venture partner of GV.

(3) John Evans, a member of our board of directors, was a venture partner of ARCH Venture Partners from April 2017 to March 2021.

(4) John Evans, a member of our board of directors, is the chief executive officer and a member of the board of directors of Beam Therapeutics Inc.

In March 2020, we issued an aggregate of 49,749,167 shares of our Series A preferred stock at a price per share of $0.5980 in cash, for an aggregate purchase price of $29.8 million. The following table sets forth the aggregate number of shares of our Series A preferred stock that we issued to our directors, officers and 5% stockholders and their affiliates and the aggregate amount of consideration for such shares:

Purchaser	Number of shares of Series A preferred stock	Cash purchase price
GV 2017, L.P.(1)(2)	29,264,214	$17,500,000
Entities affiliated with ARCH Venture Partners(3)	7,107,024	4,250,000
Biomatics Capital Partners, L.P.	7,107,024	4,250,000
Beam Therapeutics Inc.(4)	1,254,181	750,000

(1) Krishna Yeshwant, a member of our board of directors, is a managing partner of GV.

(2) Anthony Philippakis, a former member of our board of directors, is a venture partner of GV.

(3) John Evans, a member of our board of directors, was a venture partner of ARCH Venture Partners from April 2017 to March 2021.

(4) John Evans, a member of our board of directors, is the chief executive officer and a member of the board of directors of Beam Therapeutics Inc.

Each share of our Series A preferred stock is convertible into 0.108 shares of common stock.

Harvard/Broad license agreements

In March 2019, we entered into license agreements with The Broad Institute, Inc., or Broad, and the President and Fellows of Harvard College, or Harvard (as amended, the Cas9 License Agreement) and with Broad (the CpF1 License Agreement and, together with the Cas9 License Agreement, the Harvard/Broad License Agreements) for certain base editing technologies pursuant to which we received exclusive, worldwide, sublicensable, royalty-bearing licenses under specified patent rights to develop and commercialize licensed products and nonexclusive, worldwide, sublicensable, royalty-bearing licenses under certain patent rights to research and develop licensed products. Anthony Philippakis, a former member of our board of directors, is chief data officer of Broad.

In connection with the Cas9 License Agreement, we paid $0.1 million in non-refundable upfront license fees and issued 276,075 shares of our common stock to Broad and Harvard. In connection with the CpF1 License Agreement, we paid $0.1 million in non-refundable upfront license fees and also issued 138,037 shares of our common stock to Broad.

In February 2021, we provided written notice to Broad of our intent to terminate the CpF1 License Agreement, which termination would be effective in June 2021.

Under the Cas9 License Agreement, upon the first to occur of certain events, we are required to issue to Broad and Harvard additional shares of our comment stock, as further described under “Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College—Expected issuance of shares in a private placement in connection with this offering.”

We are also required to make success payments under the Harvard/Broad License Agreements as further described under “Business—License and collaboration agreements—Cas9 license agreement with The Broad Institute and the President and Fellows of Harvard College.”

See “Business—License and collaboration agreements—Cas9 license agreement with The Broad Institute and the President and Fellows of Harvard College” for additional information regarding the Cas9 License Agreement.

Collaboration and license agreement

In April 2019, we entered into a collaboration and license agreement, or the Beam Agreement, with Beam Therapeutics Inc., or Beam. John Evans, a member of our board of directors, is the chief executive officer and a member of the board of directors of Beam. Under the terms of the Beam Agreement, we received exclusive access to Beam's base editing technology, gene editing and delivery technologies for human therapeutic applications against certain cardiovascular targets. We granted Beam a non-exclusive license under know-how and patents controlled by us and an interest in joint collaboration technology.

In connection with the Beam Agreement, we issued 276,075 shares of our common stock to Beam.

We are required to pay milestone payments for certain clinical and regulatory events and Beam has the option, after the completion of Phase 1 trials, to participate in future development and commercialization and share 50 percent of U.S. profits and losses for any product directed against these targets.

Either party may owe the other party other milestone payments for certain clinical and regulatory events related to the delivery technology products.

Royalty payments may become due by either party to the other based on the net sales of any commercialized delivery technology products under the agreement.

See "Business—License and collaboration agreements—Collaboration and license agreement with Beam Therapeutics" for additional information regarding this agreement.

Series A-2 preferred stock financing

In April 2020, we issued an aggregate of 56,584,999 shares of our Series A-2 preferred stock at a price per share of $0.8041 in cash, for an aggregate purchase price of $45.5 million. The following table sets forth the aggregate number of shares of our Series A-2 preferred stock that we issued to our directors, officers and 5% stockholders and their affiliates and the aggregate amount of consideration for such shares:

Purchaser	Number of shares of Series A-2 preferred stock	Cash purchase price
GV 2019, L.P. (1)(2)	37,308,792	$30,000,000
Biomatics Capital Partners, L.P.	9,016,291	7,250,000
Entities affiliated with ARCH Venture Partners(3)	9,016,290	7,250,000

(1) Krishna Yeshwant, a member of our board of directors, is a managing partner of GV.

(2) Anthony Philippakis, a former member of our board of directors, is a venture partner of GV.

(3) John Evans, a member of our board of directors, was a venture partner of ARCH Venture Partners from April 2017 to March 2021.

In June 2020, we issued an aggregate of 21,763,462 shares of our Series A-2 preferred stock at a price per share of $0.8041 in cash, for an aggregate purchase price of $17.5 million. The following table sets forth the aggregate number of shares of our Series A-2 preferred stock that we issued to our directors, officers and 5% stockholders and their affiliates and the aggregate amount of consideration for such shares:

Purchaser	Number of shares of Series A-2 preferred stock	Cash purchase price
Wellington Biomedical Innovation Master Investors (Cayman) I L.P.	12,436,264	$10,000,000
Casdin Partners Master Fund, L.P.	9,327,198	7,500,000

Each share of our Series A-2 preferred stock is convertible into 0.108 shares of common stock.

Series B preferred stock financing

In January 2021, we issued an aggregate of 77,163,022 shares of our Series B preferred stock at a price per share of $1.2182 in cash, for an aggregate purchase price of $94 million. The following table sets forth the aggregate number of shares of our Series B preferred stock that we issued to our directors, officers and 5% stockholders and their affiliates and the aggregate amount of consideration for such shares:

Purchaser	Number of shares of Series B preferred stock	Cash purchase price
Wellington Biomedical Innovation Master Investors (Cayman) I L.P.	10,671,482	$13,000,000
Entities affiliated with Casdin Capital	8,619,274	10,500,000
GV 2019, L.P.(1)(2)	4,104,416	5,000,000
Biomatics Capital Partners, L.P.	820,883	1,000,000

(1) Krishna Yeshwant, a member of our board of directors, is a managing partner of GV.

(2) Anthony Philippakis, a former member of our board of directors, is a venture partner of GV.

Each share of our Series B preferred stock is convertible into 0.108 shares of common stock.

Registration rights

We are a party to an investors' rights agreement with the holders of our preferred stock, including our 5% stockholders and their affiliates and entities affiliated with some of our directors. This investors' rights agreement provides these holders the right, subject to certain conditions, beginning six months following the completion of this offering, to demand that we file a registration statement or to request that their shares be covered by a registration statement that we are otherwise filing.

See "Description of capital stock—Registration rights" for additional information regarding these registration rights.

Indemnification agreements

Our certificate of incorporation that will become effective upon the closing of this offering provides that we will indemnify our directors and officers to the fullest extent permitted by Delaware law. In addition, we have entered into new indemnification agreements with all of our directors and executive officers. These indemnification agreements require us, among other things, to indemnify each such director or executive officer for some expenses, including attorneys' fees, judgments, fines and settlement amounts incurred by him or her in any action or proceeding arising out of his or her service as one of our directors or executive officers.

Employment agreements

We have entered into employment agreements with our named executive officers. For more information regarding these agreements, see the section entitled "Executive compensation—Employment agreements."

Indications of interest

Prior to the date hereof, one or more funds and/or accounts affiliated with Wellington Management and Casdin Capital, 5% stockholders, together with the other cornerstone investor, have indicated an interest, severally and not jointly, in purchasing up to an aggregate of $75 million in shares in this offering at the initial public offering price. Because this indication of interest is not a binding agreement or commitment to purchase, the cornerstone investors may determine to purchase more, less or no shares in this offering or the underwriters may determine to sell more, less or no shares to any of these investors. The underwriters will receive the same discount on any of our shares purchased by the cornerstone investors as they will from any other shares sold to the public in this offering.

Policies and procedures for related person transactions

Our board of directors has adopted written policies and procedures for the review of any transaction, arrangement or relationship in which our company is a participant, the amount involved exceeds $120,000, and one of our executive officers, directors, director nominees or 5% stockholders, or their immediate family members, each of whom we refer to as a “related person,” has a direct or indirect material interest.

If a related person proposes to enter into such a transaction, arrangement or relationship, which we refer to as a “related person transaction,” the related person must report the proposed related person transaction to our chief executive officer. The policy calls for the proposed related person transaction to be reviewed and, if deemed appropriate, approved by our audit committee. Whenever practicable, the reporting, review and approval will occur prior to entry into the transaction. If advance review and approval is not practicable, the audit committee will review, and, in its discretion, may ratify the related person transaction. The policy also permits the chairperson of the audit committee to review and, if deemed appropriate, approve proposed related person transactions that arise between committee meetings, subject to ratification by the committee at its next meeting. Any related person transactions that are ongoing in nature will be reviewed annually.

A related person transaction reviewed under the policy will be considered approved or ratified if it is authorized by the audit committee after full disclosure of the related person’s interest in the transaction. As appropriate for the circumstances, the audit committee will review and consider:

- the related person’s interest in the related person transaction;
- the approximate dollar value of the amount involved in the related person transaction;
- the approximate dollar value of the amount of the related person’s interest in the transaction without regard to the amount of any profit or loss;
- whether the transaction was undertaken in the ordinary course of our business;
- whether the terms of the transaction are no less favorable to us than terms that could have been reached with an unrelated third party;
- the purpose, and the potential benefits to us, of the transaction; and
- any other information regarding the related person transaction or the related person in the context of the proposed transaction that would be material to investors in light of the circumstances of the particular transaction.

Our audit committee may approve or ratify the transaction only if it determines that, under all of the circumstances, the transaction is in, or is not inconsistent with, our best interests. Our audit committee may impose any conditions on the related person transaction that it deems appropriate.

In addition to the transactions that are excluded by the instructions to the SEC’s related person transaction disclosure rule, our board of directors has determined that the following transactions do not create a material direct or indirect interest on behalf of related persons and, therefore, are not related person transactions for purposes of this policy:

- interests arising solely from the related person’s position as an executive officer of another entity, whether or not the person is also a director of such entity, that is a participant in the transaction where the related person and all other related persons own in the aggregate less than a 10% equity interest in such entity, the related person and his or her immediate family members are not involved in the negotiation of the terms of the transaction and do not receive any special benefits as a result of the transaction and the amount involved in the transaction is less than the greater of $200,000 or 5% of the annual gross revenues of the company receiving payment under the transaction; and

- a transaction that is specifically contemplated by provisions of our certificate of incorporation or bylaws.

The policy provides that transactions involving compensation of executive officers shall be reviewed and approved by our compensation committee in the manner specified in the compensation committee's charter.

We did not have a written policy regarding the review and approval of related person transactions prior to this offering. Nevertheless, with respect to such transactions, it has been the practice of our board of directors to consider the nature of and business reasons for such transactions, how the terms of such transactions compared to those which might be obtained from unaffiliated third parties and whether such transactions were otherwise fair to and in the best interests of, or not contrary to, our best interests.

Principal stockholders

The following table sets forth information with respect to the beneficial ownership of our common stock as of May 31, 2021 by:

- each of our directors;
- each of our named executive officers;
- all of our directors and executive officers as a group; and
- each person, or group of affiliated persons, who is known by us to beneficially own more than 5% of our common stock.

The column entitled “Percentage of shares beneficially owned—Before offering” is based on a total of 3,475,634 shares of our common stock outstanding as of May 31, 2021, including 313,620 shares of unvested restricted stock subject to a repurchase option, and assuming the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 27,720,923 shares of our common stock upon the closing of this offering. The column entitled “Percentage of shares beneficially owned—After offering” is based on 46,110,444 shares of our common stock to be outstanding after this offering, including the shares of our common stock that we are selling in this offering, our issuance of an aggregate of 878,098 shares of common stock to The Broad Institute and the President and Fellows of Harvard College upon the closing of this offering pursuant to our Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under “Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College” and the 313,620 shares of unvested restricted stock subject to a repurchase option, but not including any additional shares issuable upon exercise of outstanding options or any additional shares issuable upon the underwriters’ option to purchase additional shares.

Beneficial ownership is determined in accordance with the rules and regulations of the SEC and includes voting or investment power with respect to our common stock. Shares of our common stock that an individual has a right to acquire within 60 days after May 31, 2021 are considered outstanding and beneficially owned by the person holding such right for the purpose of calculating the percentage ownership of that person but not for the purpose of calculating the percentage ownership of any other person, except with respect to the percentage ownership of all directors and executive officers. Except as otherwise noted, the persons and entities in this table have sole voting and investing power with respect to all of the shares of our common stock beneficially owned by them, subject to community property laws, where applicable. Unless otherwise indicated, the address of each beneficial owner is c/o Verve Therapeutics, Inc., 500 Technology Square, Suite 901, Cambridge, Massachusetts 02139.

Name of beneficial owner	Number of shares beneficially owned	Percentage of shares beneficially owned: Before offering (%)	Percentage of shares beneficially owned: After offering (%)
5% Stockholders			
Entities affiliated with GV 2017, L.P.(1)	10,793,414	34.6	23.4
Biomatics Capital Partners, L.P.(2)	2,597,464	8.3	5.6
Entities affiliated with ARCH Venture Partners(3)	2,508,809	8.0	5.4
Wellington Biomedical Innovation Master Investors (Cayman) I L.P.(4)	2,495,571	8.0	5.4
Entities affiliated with Casdin Capital (5)	1,938,167	6.2	4.2
Directors and named executive officers			
Sekar Kathiresan, M.D.(6)	818,023	2.6	1.8
Andrew Ashe, J.D.(7)	183,071	*	*
Andrew Bellinger, M.D., Ph.D.(8)	111,371	*	*
Burt Adelman, M.D.(9)	412,325	1.3	*
John Evans(10)	8,548	*	*
Michael MacLean	—	—	—
Sheila Mikhail(11)	2,699	*	*
Krishna Yeshwant, M.D.(1)(12)	10,793,414	34.6	23.4
All current executive officers and directors as a group (8 persons)(13)	12,329,451	39.0	26.5

* Less than one percent

(1) Consists of (i) 6,320,905 shares of common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by GV 2017, L.P. and (ii) 4,472,509 shares of common stock issuable upon conversion of shares of our preferred stock upon the closing of this offering held by GV 2019, L.P. GV 2017 GP, L.P. (the general partner of GV 2017, L.P.), GV 2017 GP, L.L.C. (the general partner of GV 2017 GP, L.P.), Alphabet Holdings LLC (the managing member of GV 2017 GP, L.L.C.), XXVI Holdings Inc. (the managing member of Alphabet Holdings LLC) and Alphabet Inc. (the controlling stockholder of XXVI Holdings Inc.) may each be deemed to have sole power to vote or dispose of the shares held directly by GV 2017, L.P. GV 2019 GP, L.P. (the general partner of GV 2019, L.P.), GV 2019 GP, L.L.C. (the general partner of GV 2019 GP, L.P.), Alphabet Holdings LLC (the managing member of GV 2019 GP, L.L.C.), XXVI Holdings Inc. (the managing member of Alphabet Holdings LLC) and Alphabet Inc. (the controlling stockholder of XXVI Holdings Inc.) may each be deemed to have sole power to vote or dispose of the shares held directly by GV 2019, L.P. The principal business address of GV 2017, L.P., GV 2017 GP, L.P., GV 2017 GP, L.L.C., GV 2019, L.P., GV 2019 GP, L.P., GV 2019 GP, L.L.C., Alphabet Holdings LLC, XXVI Holdings Inc. and Alphabet Inc. is 1600 Amphitheatre Parkway, Mountain View, CA 94043.

(2) Consists of 2,597,464 shares of common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by Biomatics Capital Partners, L.P. Biomatics Capital Management, L.L.C. (the general partner of Biomatics Capital Partners, L.P.) may be deemed to have sole power to vote or dispose of the shares held directly by Biomatics Capital Partners, L.P. Julie Sunderland and Boris Nikolic are managing partners of Biomatics Capital Partners, L.P. and exercise shared voting and investment power of the securities held by Biomatics Capital Partners, LP. The principal business address of Biomatics Capital Partners, L.P. and Biomatics Capital Management, L.L.C. is 188 E Blaine Street, Suite 126, Seattle, WA 98102.

(3) Consists of (i) 1,254,404 shares of common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by ARCH Venture Fund X, L.P., or ARCH X, and (ii) 1,254,405 shares of common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by ARCH Venture Fund X Overage, L.P., or ARCH X Overage. ARCH Venture Partners X, L.P., or AVP X LP, is the sole general partner of ARCH X. ARCH Venture Partners X Overage, L.P., or AVP X Overage LP, is the sole general partner of ARCH X Overage. ARCH Venture Partners X, LLC, or AVP X LLC, is the sole general partner of each of AVP X LP and AVP X Overage LP. As members of the investment committee of AVP X LLC, each of Keith Crandell, Kristina Burow, Steven Gillis and Robert Nelsen (the “Committee Members”) may also be deemed to share the power to direct the disposition and vote of the ARCH X and ARCH X Overage shares. AVP X LP and AVP X Overage LP may be deemed to beneficially own the shares held by ARCH X and ARCH X Overage, respectively, AVP X LLC may be deemed to beneficially own the shares held by ARCH X and ARCH X Overage, and each of the Committee Members may be deemed to share the power to direct the disposition and vote of the shares held by ARCH X and ARCH X Overage. AVP X LP, AVP X Overage LP, AVP X LLC, and the Committee Members each disclaim beneficial ownership, except, in each case, to the extent of any pecuniary interest therein. The principal business address of ARCH X, ARCH X Overage, AVP X LP, AVP X Overage LP, AVP X LLC and the Committee Members is 8755 Higgins Road, Suite 1025, Chicago, IL 60631.

(4) Consists of 2,495,571 shares of common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by Wellington Biomedical Innovation Master Investors (Cayman) I L.P., or Wellington Biomedical Fund. Wellington Management Company LLP, a registered investment adviser under the Investment Advisers Act of 1940, as amended, is the investment adviser to Wellington

Biomedical Fund, and Wellington Alternative Investments LLC is its general partner. Wellington Management Investment, Inc. is the managing member of Wellington Alternative Investments LLC. Wellington Management Company LLP is an indirect subsidiary of Wellington Management Group LLP. Wellington Management Group LLP and Wellington Management Company LLP may be deemed beneficial owners with shared voting and investment power over the shares held by Wellington Biomedical Fund. Wellington Management Group LLP is a Massachusetts limited liability partnership, privately held by 182 partners (as of January 1, 2021). There are no external entities with any ownership interest in Wellington Management Group LLP. Individual percentages of ownership are confidential. However, no single partner owns or has the right to vote more than 5% of the Wellington Management Group LLP's capital. Additional information about Wellington Management Company LLP is available in its Form ADV filed with the SEC. The principal business address of Wellington Biomedical Fund and the Wellington entities is 280 Congress Street, Boston, MA 02210. The amounts in the table above do not take into account the shares of our common stock, if any, that Wellington Management Company LLP may purchase in this offering as a cornerstone investor.

(5) Consists of (i) 317,596 shares of our common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by Casdin Partners Master Fund, L.P. and (ii) 620,571 shares of our common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering held by Casdin Private Growth Equity Fund, L.P. Casdin Capital, LLC is the investment adviser to Casdin Partners Master Fund, L.P. and Casdin Private Growth Equity Fund, L.P. Casdin Partners GP, LLC is the general partner of Casdin Partners Master Fund, L.P. Casdin Partners Private Growth Equity Fund GP, LLC is the general partner of Casdin Private Growth Equity Fund, L.P. Eli Casdin is the managing member of Casdin Capital, LLC, Casdin Partners GP, LLC and Casdin Partners Private Growth Equity Fund GP, LLC. Each of Casdin Capital, LLC, Casdin Partners GP, LLC and Eli Casdin may be deemed to indirectly beneficially own shares held by Casdin Partners Master Fund, L.P. Each of Casdin Capital, LLC, Casdin Partners Private Growth Equity Fund GP, LLC and Eli Casdin may be deemed to indirectly beneficially own shares held by Casdin Private Growth Equity Fund, L.P. Each of Casdin Capital, LLC, Casdin Partners GP, LLC, Casdin Partners Private Growth Equity Fund, L.P. and Eli Casdin disclaims beneficial ownership of such securities except to the extent of their respective pecuniary interest therein. The principal business address of Casdin Capital is 1350 Avenue of the Americas, Suite 2600, New York, NY 10019. The amounts in the table above do not take into account the shares of our common stock, if any, that Casdin Capital may purchase in this offering as a cornerstone investor.

(6) Consists of (i) 566,030 shares of common stock held by Dr. Kathiresan, of which 53,336 remain subject to vesting 60 days after May 31, 2021, and (ii) 251,993 shares of common stock underlying options held by Dr. Kathiresan that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date.

(7) Consists of (i) 166,722 shares of common stock held by Mr. Ashe and (ii) 16,349 shares of common stock underlying options held by Mr. Ashe that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date.

(8) Consists of 111,371 shares of common stock underlying options held by Dr. Bellinger that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date.

(9) Consists of (i) 409,626 shares of common stock held by Dr. Adelman, of which 42,669 remain subject to vesting 60 days after May 31, 2021 and (ii) 2,699 shares of common stock underlying an option held by Dr. Adelman that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date.

(10) Consists of 8,548 shares of common stock underlying options held by Mr. Evans that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date. Mr. Evans is the also the chief executive officer of Beam Therapeutics Inc. Mr. Evans does not have voting or dispositive power over any of the shares directly held by Beam Therapeutics Inc., which includes (i) 276,075 shares of common stock and (ii) 270,895 shares of common stock issuable upon the automatic conversion of shares of our preferred stock upon the closing of this offering.

(11) Consists of 2,699 shares of common stock underlying an option held by Ms. Mikhail that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date.

(12) Dr. Yeshwant, a member of our board of directors, is a managing partner of GV. Dr. Yeshwant does not have voting or dispositive power over any of the shares directly held by GV 2017, L.P. or GV 2019, L.P. referenced in footnote (1) above.

(13) Consists of (i) 1,142,378 shares of common stock, of which 96,005 remain subject to vesting 60 days after May 31, 2021, (ii) 10,793,414 shares of common stock underlying shares of preferred stock, and (iii) 393,659 shares of common stock underlying options that are exercisable as of May 31, 2021 or will become exercisable within 60 days after such date.

Description of capital stock

The following description of our capital stock and provisions of our certificate of incorporation and bylaws are summaries and are qualified by reference to the certificate of incorporation and bylaws that will become effective upon the closing of this offering. We have filed copies of these documents with the SEC as exhibits to our registration statement of which this prospectus is a part. The description of the capital stock reflects changes to our capital structure that will occur upon the closing of this offering.

Upon the closing of this offering, our authorized capital stock will consist of 200,000,000 shares of our common stock, par value $0.001 per share, and 5,000,000 shares of our preferred stock, par value $0.001 per share, all of which preferred stock will be undesignated.

As of May 31, 2021, we had issued and outstanding:

- 3,475,634 shares of common stock, which includes 313,620 shares of unvested restricted stock subject to a repurchase option. These shares are held by 29 holders of record;
- 101,170,571 shares of Series A preferred stock that are convertible into 10,926,133 shares of common stock. These shares are held by 9 holders of record;
- 78,348,461 shares of Series A-2 preferred stock that are convertible into 8,461,411 shares of common stock. These shares are held by 7 holders of record; and
- 77,163,022 shares of Series B preferred stock that are convertible into 8,333,379 shares of common stock. These shares are held by 22 holders of record.

Upon the closing of this offering, all of the outstanding shares of our preferred stock will automatically convert into an aggregate of 27,720,923 shares of our common stock.

Common stock

Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. Each election of directors by our stockholders will be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of outstanding preferred stock.

In the event of our liquidation or dissolution, the holders of our common stock are entitled to receive proportionately all assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any of our outstanding preferred stock. Holders of our common stock have no preemptive, subscription, redemption or conversion rights. The rights, preferences and privileges of 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 and issue in the future.

Preferred stock

Under the terms of our certificate of incorporation that will become effective upon the closing of this offering, our board of directors is authorized to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock.

The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of our outstanding voting stock. Upon the closing of this offering, there will be no shares of preferred stock outstanding, and we have no present plans to issue any shares of preferred stock.

Options and unvested restricted common stock

As of May 31, 2021, options to purchase an aggregate of 5,258,661 shares of our common stock were outstanding under our 2018 Plan, at a weighted average exercise price of $4.26 per share, and 313,620 shares of unvested restricted common stock were outstanding. See “Executive compensation—Employee benefit and equity compensation plans” for additional information regarding the terms of our 2018 Plan.

Delaware anti-takeover law and certain charter and bylaw provisions

Delaware law

We are subject to Section 203 of the DGCL. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a “business combination” with any “interested stockholder” for three years following the date that the person became an interested stockholder, unless either the interested stockholder attained such status with the approval of our board of directors, the business combination is approved by our board of directors and stockholders in a prescribed manner or the interested stockholder acquired at least 85% of our outstanding voting stock in the transaction in which it became an interested stockholder. A “business combination” includes, among other things, a merger or consolidation involving us and the “interested stockholder” and the sale of more than 10% of our assets. In general, an “interested stockholder” is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person. The restrictions contained in Section 203 are not applicable to any of our existing stockholders that will own 15% or more of our outstanding voting stock upon the closing of this offering.

Staggered board; removal of directors

Our certificate of incorporation and our bylaws to be effective upon the closing of this offering divide our board of directors into three classes with staggered three-year terms. In addition, our certificate of incorporation and our bylaws to be effective upon the closing of this offering provide that directors may be removed only for cause and only by the affirmative vote of the holders of at least 75% of our shares of capital stock present in person or by proxy and entitled to vote. Under our certificate of incorporation and our bylaws to be effective upon the closing of this offering, any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, may be filled only by vote of a majority of our directors then in office. Furthermore, our certificate of incorporation to be effective upon the closing of this offering provides that the authorized number of directors may be changed only by the resolution of our board of directors. The classification of our board of directors and the limitations on the ability of our stockholders to remove directors, change the authorized number of directors and fill vacancies could make it more difficult for a third party to acquire, or discourage a third party from seeking to acquire, control of our company.

Stockholder action; special meeting of stockholders; advance notice requirements for stockholder proposals and director nominations

Our certificate of incorporation and our bylaws to be effective upon the closing of this offering provide that any action required or permitted to be taken by our stockholders at an annual meeting or special meeting of stockholders may only be taken if it is properly brought before such meeting and may not be taken by written action in lieu of a meeting. Our certificate of incorporation and our bylaws to be effective upon the closing of this offering also provide that, except as otherwise required by law, special meetings of the stockholders can only be called by our board of directors. In addition, our bylaws to be effective upon the closing of this offering establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of stockholders, including proposed nominations of candidates for election to our board of directors. Stockholders at an annual meeting may only consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of our board of directors, or by a stockholder of record on the record date for the meeting who is entitled to vote at the meeting and who has delivered timely written notice in proper form to our secretary of the stockholder's intention to bring such business before the meeting. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities. These provisions also could discourage a third party from making a tender offer for our common stock because even if the third party acquired a majority of our outstanding voting stock, it would be able to take action as a stockholder, such as electing new directors or approving a merger, only at a duly called stockholders meeting and not by written consent.

Super-majority voting

The DGCL provides generally that the affirmative vote of a majority of the shares entitled to vote on any matter is required to amend a corporation's certificate of incorporation or bylaws unless a corporation's certificate of incorporation or bylaws, as the case may be, requires a greater percentage. Our bylaws to be effective upon the closing of this offering may be amended or repealed by a majority vote of our board of directors or the affirmative vote of the holders of at least 75% of the votes that all our stockholders would be entitled to cast in any annual election of directors. In addition, the affirmative vote of the holders of at least 75% of the votes that all our stockholders would be entitled to cast in any election of directors is required to amend or repeal or to adopt any provisions inconsistent with any of the provisions of our certificate of incorporation described above.

Exclusive forum selection

Our certificate of incorporation to be effective upon the closing of this offering provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or, if the Court of Chancery of the State of Delaware does not have jurisdiction, the federal district court for the District of Delaware) shall be the sole and exclusive forum for the following types of proceedings: (1) any derivative action or proceeding brought on behalf of our company, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, employees or stockholders to our company or our stockholders, (3) any action asserting a claim arising pursuant to any provision of the General Corporation Law of the State of Delaware or as to which the General Corporation Law of the State of Delaware confers jurisdiction on the Court of Chancery of the State of Delaware, or (4) any action asserting a claim arising pursuant to any provision of our certificate of incorporation or amended and restated bylaws (in each case, as they may be amended from time to time) or governed by the internal affairs doctrine. These choice of forum provisions will not apply to suits brought to enforce a duty or liability created by the Exchange Act. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our certificate of incorporation that will become effective upon the closing of this offering

provides that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States of America shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolution of any claims arising under the Securities Act. 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. In such instance, we would expect to vigorously assert the validity and enforceability of the exclusive forum provisions of our certificate of incorporation. This may require significant additional costs associated with resolving such action in other jurisdictions and there can be no assurance that the provisions will be enforced by a court in those other jurisdictions.

Registration rights

We have entered into a second amended and restated investors' rights agreement dated as of January 14, 2021 or the investors' rights agreement, with holders of our preferred stock. Beginning 180 days after this offering, holders of a total of 27,996,998 shares of our common stock will have the right to require us to register these shares under the Securities Act upon demand and in connection with any registration statement that we plan to file, as described below under "—Demand registration rights" and "—Incidental registration rights." We refer to the shares with these registration rights as registrable securities. After registration pursuant to these rights, the registrable securities will become freely tradable without restriction under the Securities Act.

Demand registration rights

Beginning 180 days after the effective date of the registration statement of which this prospectus is a part, subject to specified limitations set forth in the investors' rights agreement, at any time, the holders of the then outstanding registrable securities may demand that we register at least 40% of the registrable securities then outstanding under the Securities Act for purposes of a public offering. We are not obligated to file a registration statement pursuant to this provision on more than two occasions.

In addition, subject to specified limitations set forth in the investors' rights agreement, at any time after we become eligible to file a registration statement on Form S-3, the holders of at least 20% of the then outstanding registrable securities may request that we register their registrable securities on Form S-3 for purposes of a public offering for which the reasonably anticipated aggregate offering price to the public of at least $5 million, net of selling expenses. We are not obligated to file a registration statement pursuant to this provision on more than two occasions in any 12-month period.

Incidental registration rights

If, at any time after the closing of this offering, we propose to register for our own account any of our securities under the Securities Act, the holders of registrable securities will be entitled to notice of the registration and, subject to specified exceptions, have the right to require us to register all or a portion of the registrable securities then held by them in that registration. We have the right to terminate or withdraw any registration initiated by us before the effective date of such registration.

In the event that any registration in which the holders of registrable securities participate pursuant to our investors' rights agreement is an underwritten public offering, we have agreed to enter into an underwriting agreement in usual and customary form.

Expenses

Pursuant to the investors' rights agreement, we are required to pay all registration expenses, including all registration, filing and qualification fees, printing and accounting expenses, and reasonable fees and

disbursements, not to exceed $75,000, of one counsel selected by the selling stockholders to represent the selling stockholders, but excluding underwriting discounts, selling commissions, stock transfer taxes applicable to the sale of any registrable securities and the fees and disbursements of the selling stockholders' own counsel (other than the counsel selected to represent all selling stockholders). If a registration is withdrawn at the request of the stockholders initiating the registration, then the stockholders will bear the expenses of the registration.

The investors' rights agreement contains customary cross-indemnification provisions, pursuant to which we are obligated to indemnify the selling stockholders in the event of material misstatements or omissions in the registration statement attributable to us or any violation or alleged violation whether by action or inaction by us under the Securities Act, the Exchange Act, any state securities or Blue Sky law or any rule or regulation promulgated under the Securities Act, the Exchange Act or any state securities or Blue Sky law in connection with such registration statement or the qualification or compliance of the offering, and they are obligated to indemnify us for material misstatements or omissions in the registration statement attributable to them.

License agreement with The Broad Institute and the President and Fellows of Harvard College

Issuance of shares in a private placement in connection with this offering

Under our Cas9 license agreement with The Broad Institute, Inc., or Broad, and the President and Fellows of Harvard College, or Harvard, upon the first to occur of certain events, we are required to issue to Broad and Harvard additional shares of our common stock, such that the sum of the total number of shares we have issued to Broad and Harvard pursuant to the license agreement represents 2% of our capital stock on a fully diluted basis. Among the events that could trigger this obligation are (i) this initial public offering, if the post-money valuation (calculated as the price per share at which shares are sold in this offering multiplied by the fully diluted number of shares of capital stock outstanding following the closing of this offering), exceeds $500 million, which we refer to as the Valuation Trigger, or (ii) following this initial public offering and after we have filed a Form 10-Q under the Exchange Act, if and when our market capitalization equals at least $500 million.

Based on our issuance and sale of 14,035,789 shares of our common stock in this offering at the initial public offering price of $19.00 per share, this initial public offering is the Valuation Trigger, and we will issue an aggregate of 878,098 shares of common stock to Broad and Harvard upon the closing of this offering.

Success payments and registration rights

Under our Cas9 license agreement with the Broad and Harvard, we are also obligated to make certain success payments as described in "Business—License and collaboration agreements—Cas9 license agreement with The Broad Institute and the President and Fellows of Harvard College", which payments may be made, at our election, in cash or by the issuance of shares of our common stock. In the event that we issue shares of our common stock to Broad and Harvard to satisfy any or all of our success payment obligations, we have agreed to register the resale of such shares by Broad and Harvard on a Form S-1 or Form S-3, as applicable, and to cover all registration expenses related thereto.

Transfer agent and registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, N.A.

Nasdaq Global Select Market

Our common stock has been approved for listing on the Nasdaq Global Select Market under the symbol "VERV."

Shares eligible for future sale

Prior to this offering, there has been no public market for our common stock, and a liquid trading market for our common stock may not develop or be sustained after this offering. Future sales of substantial amounts of our common stock in the public market, including shares issued upon exercise of outstanding options, or the anticipation of these sales, could adversely affect market prices prevailing from time to time and could impair our ability to raise capital through sales of equity securities.

Upon the closing of this offering, we will have outstanding 46,110,444 shares of our common stock, based on the 3,475,634 shares of our common stock that were outstanding on May 31, 2021, including 313,620 shares of unvested restricted stock subject to a repurchase option, and after giving effect to (i) the issuance of 14,035,789 shares of our common stock in this offering, assuming no exercise by the underwriters of their option to purchase additional shares of our common stock, (ii) the issuance of an aggregate of 878,098 shares of common stock to The Broad Institute and the President and Fellows of Harvard College upon the closing of this offering pursuant to our Cas9 License Agreement, based on our issuance and sale of 14,035,789 shares of our common stock in this offering as further described under “Description of capital stock—License agreement with The Broad Institute and the President and Fellows of Harvard College,” and (iii) the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 27,720,923 shares of our common stock upon the closing of this offering. Of these shares, all shares sold in this offering will be freely tradable without restriction or further registration under the Securities Act unless purchased by our “affiliates,” as that term is defined in Rule 144 under the Securities Act.

The remaining 31,610,982 shares of our common stock will be “restricted securities” under Rule 144, and we expect that substantially all of these restricted securities will be subject to the 180-day lock-up period under the lock-up agreements as described below. These restricted securities may be sold in the public market upon release or waiver of any applicable lock-up agreements and only if registered or pursuant to an exemption from registration, such as Rule 144 or Rule 701 under the Securities Act.

Rule 144

In general, under Rule 144, beginning 90 days after the date of this prospectus, any person who is not our affiliate and has held their shares for at least six months, including the holding period of any prior owner other than one of our affiliates, may sell those shares without restriction, subject to the availability of current public information about us. In addition, under Rule 144, any person who is not our affiliate and has not been our affiliate at any time during the preceding three months and has held their shares for at least one year, including the holding period of any prior owner other than one of our affiliates, would be entitled to sell an unlimited number of shares immediately upon the closing of this offering without regard to whether current public information about us is available.

Beginning 90 days after the date of this prospectus, a person who is our affiliate or who was our affiliate at any time during the preceding three months and who has beneficially owned restricted securities for at least six months, including the holding period of any prior owner other than one of our affiliates, is entitled to sell a number of shares within any three-month period that does not exceed the greater of:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately 461,104 shares immediately after this offering; and
- the average weekly trading volume in our common stock on the Nasdaq Global Select Market during the four calendar weeks preceding the date of filing of a Notice of Proposed Sale of Securities Pursuant to Rule 144 with respect to the sale.

Sales under Rule 144 by our affiliates are also subject to manner of sale provisions and notice requirements and to the availability of current public information about us.

Upon waiver or expiration of the 180-day lock-up period described below, approximately 31,610,982 shares of our common stock will be eligible for sale under Rule 144. We cannot estimate the number of shares of our common stock that our existing stockholders will elect to sell under Rule 144.

Rule 701

In general, under Rule 701 of the Securities Act, any of our employees, consultants or advisors, other than our affiliates, who purchased shares from us in connection with a qualified compensatory stock plan or other written agreement is eligible to resell these shares 90 days after the date of this prospectus in reliance on Rule 144, but without compliance with the various restrictions, including the availability of public information about us, holding period and volume limitations, contained in Rule 144. Substantially all Rule 701 shares are subject to the 180-day lock-up period described below and will be eligible for sale in accordance with Rule 701 upon expiration of the restrictions set forth in those agreements.

Lock-up agreements

We and each of our executive officers and directors and the holders of substantially all of our outstanding stock have agreed that, without the prior written consent of J.P. Morgan Securities LLC, Jefferies LLC, Guggenheim Securities, LLC and William Blair & Company, L.L.C. on behalf of the underwriters, we and they will not, subject to limited exceptions, during the period ending 180 days after the date of this prospectus:

- offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock beneficially owned (as such term is used in Rule 13d-3 of the Securities Exchange Act of 1934, as amended) or any other securities so owned convertible into or exercisable or exchangeable for our common stock, or make any public announcement of an intention to do any of the foregoing; or
- enter into any hedging, swap or other agreement or transaction that transfers, in whole or in part, any of the economic consequences of ownership of our common stock or any other securities so owned convertible into or exercisable or exchangeable for our common stock.

These agreements are subject to certain exceptions, as described in the section of this prospectus entitled “Underwriting.”

Registration rights

Beginning 180 days after this offering, the holders of an aggregate of 27,996,998 shares of our common stock will have rights, subject to certain 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. After registration pursuant to these rights, these shares will become freely tradable without restriction under the Securities Act. See “Description of capital stock—Registration rights” for additional information regarding these registration rights.

Stock options and Form S-8 registration statement

Following this offering, we intend to file one or more registration statements on Form S-8 under the Securities Act to register all of the shares of our common stock subject to outstanding awards and reserved for future issuance under the 2018 Plan, the 2021 Plan and the 2021 ESPP. See “Executive compensation—Incentive shares and stock option and other compensation plans” for additional information regarding these plans. Accordingly, shares of our common stock registered under the registration statements will be available for sale in the open market, subject to Rule 144 volume limitations applicable to affiliates, and subject to any vesting restrictions and lock-up agreements applicable to these shares.

Material U.S. federal tax considerations for non-U.S. holders of common stock

The following is a discussion of material U.S. federal income and estate tax considerations relating to ownership and disposition of our common stock by a non-U.S. holder. For purposes of this discussion, the term “non-U.S. holder” means a beneficial owner (other than a partnership or other entity or arrangement treated as a pass-through entity) of our common stock that is not, for U.S. federal income tax purposes:

- an individual who is a citizen or resident of the United States;
- a corporation, or other entity treated as a corporation for U.S. federal income tax purposes, created or organized in or 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 taxation regardless of its source; or
- a trust, if a U.S. court is able to exercise primary supervision over the administration of the trust and one or more U.S. persons have authority to control all substantial decisions of the trust or if the trust has a valid election in effect to be treated as a U.S. person under applicable U.S. Treasury Regulations.

This discussion is based on current provisions of the Code, existing and proposed U.S. Treasury Regulations promulgated thereunder, current administrative rulings and judicial decisions, each as in effect as of the date of this prospectus, and all of which are subject to change or to differing interpretation, possibly with retroactive effect. Any such change or different interpretation could alter the tax considerations to non-U.S. holders described in this prospectus. In addition, there can be no assurance that the Internal Revenue Service, or the IRS, will not challenge one or more of the tax considerations described in this prospectus or that any such challenge would not be sustained by a court.

This discussion addresses only non-U.S. holders that hold shares of 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 aspects of U.S. federal income and estate taxation that may be relevant to a particular non-U.S. holder in light of that non-U.S. holder’s individual circumstances nor does it address the alternative minimum tax, the Medicare contribution tax on net investment income or any aspects of U.S. state, local or non-U.S. taxes. This discussion also does not consider any specific facts or circumstances that may apply to a non-U.S. holder and does not address the special tax rules applicable to particular non-U.S. holders, such as:

- insurance companies;
- tax-exempt organizations or governmental organizations;
- financial institutions;
- brokers or dealers in securities;
- pension plans;
- controlled foreign corporations;
- passive foreign investment companies;
- corporations that accumulate earnings to avoid U.S. federal income tax;
- “qualified foreign pension funds” as defined in Section 897(l)(2) of the Code and entities of all of the interests of which are held by qualified foreign pension funds;

- persons that own, or are deemed to own, more than 5% of our capital stock;
- owners that hold our common stock as part of a straddle, hedge, conversion transaction, synthetic security, or other integrated investment; and
- certain U.S. expatriates and former citizens or long-term residents of the United States.

In addition, this discussion does not address the tax treatment of partnerships or persons who hold their common stock through partnerships or other entities or arrangements that are treated as pass-through entities for U.S. federal income tax purposes. A partner in a partnership or other pass-through entity that will hold our common stock should consult his, her, or its own tax advisor regarding the tax consequences of the purchase, ownership, and disposition of our common stock through a partnership or other pass-through entity, as applicable.

Prospective investors should consult their own tax advisors regarding the U.S. federal, state, local, and non-U.S. income and other tax considerations of acquiring, holding, and disposing of our common stock in light of their particular situations.

Dividends

If we pay distributions on our common stock, those distributions generally 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. If a distribution exceeds our current and accumulated earnings and profits, the excess will be treated as a tax-free return of the non-U.S. holder's investment, up to such holder's tax basis in the common stock. Any remaining excess will be treated as capital gain, subject to the tax treatment described below under the heading "—Gain on Disposition of Common Stock."

Dividends paid to a non-U.S. holder generally will be subject to withholding of U.S. federal income tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder's country of residence. A non-U.S. holder of our common stock who claims the benefit of an applicable income tax treaty between the United States and such holder's country of residence generally will be required to provide a properly executed IRS Form W-8BEN or W-8BEN-E (or successor form) and satisfy applicable certification and other requirements. A non-U.S. holder that is eligible for a reduced rate of U.S. withholding tax under an income tax treaty may obtain a refund or credit of any excess amounts withheld by timely filing an appropriate claim with the IRS. Non-U.S. holders are urged to consult their own tax advisors regarding their entitlement to benefits under a relevant income tax treaty.

Dividends that are treated as effectively connected with a trade or business conducted by a non-U.S. holder within the United States and, if an applicable income tax treaty so provides, that are attributable to a permanent establishment or a fixed base maintained by the non-U.S. holder within the United States are generally exempt from the 30% withholding tax if the non-U.S. holder delivers a properly executed IRS Form W-8ECI, stating that the dividends are so connected and satisfies other applicable certification and disclosure requirements. However, such U.S. effectively connected income is taxed on a net income basis at the same U.S. federal income tax rates applicable to United States persons (as defined in the Code). Any U.S. effectively connected income received by a non-U.S. holder that is a corporation may also, under certain circumstances, be subject to an additional "branch profits tax" at a 30% rate or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder's country of residence.

See also the section below entitled "—FATCA" for additional withholding rules that may apply to dividends paid to certain foreign financial institutions or non-financial foreign entities.

Gain on disposition of common stock

Subject to the discussions below under the sections entitled "—Information reporting and backup withholding" and "—FATCA," a non-U.S. holder generally will not be subject to U.S. federal income tax on gain recognized on a disposition of our common stock unless:

- the gain is effectively connected with the non-U.S. holder's conduct of a trade or business in the United States and, if an applicable income tax treaty so provides, the gain is attributable to a permanent establishment or fixed base maintained by the non-U.S. holder in the United States; in these cases, the non-U.S. holder will be taxed on a net income basis at the same U.S. federal income tax rates applicable to United States persons (as defined in the Code), and if the non-U.S. holder is a foreign corporation, an additional branch profits tax at a 30% rate, or such lower rate as may be specified by an applicable income tax treaty, may also apply;
- the non-U.S. holder is a nonresident alien present in the United States for 183 days or more in the taxable year of the disposition and certain other conditions are met, in which case the non-U.S. holder will be subject to a 30% tax (or such lower rate as may be specified by an applicable income tax treaty) on the net gain derived from the disposition, which may be offset by U.S.-source capital losses of the non-U.S. holder provided the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses, if any; or
- we are, or have been at any time during the five-year period preceding such disposition (or the non-U.S. holder's holding period, if shorter), a "U.S. real property holding corporation," unless our common stock is regularly traded on an established securities market and the non-U.S. holder held no more than 5% of our outstanding common stock, directly or indirectly, during the shorter of the five year period ending on the date of the disposition or the period that the non-U.S. holder held our common stock. If we are determined to be a U.S. real property holding corporation and the foregoing exception does not apply, then the non-U.S. holder generally will be taxed on its net gain derived from the disposition at the U.S. federal income tax rates applicable to United States persons (as defined in the Code). Generally, a corporation is a "U.S. real property holding corporation" if the fair market value of its "U.S. real property interests" equals or exceeds 50% of the sum of the fair market value of its worldwide real property interests plus its other assets used or held for use in a trade or business. Although there can be no assurance, we believe that we are not currently, and we do not anticipate becoming, a "U.S. real property holding corporation" for U.S. federal income tax purposes. No assurance can be provided that our common stock will be regularly traded on an established securities market for purposes of the rule described above.

Information reporting and backup withholding

We must report annually to the IRS and to each non-U.S. holder the gross amount of the distributions on our common stock paid to such holder and the tax withheld, if any, with respect to such distributions. Non-U.S. holders may have to comply with specific certification procedures to establish that the holder is not a U.S. person (as defined in the Code) in order to avoid backup withholding at the applicable rate with respect to dividends on our common stock. Generally, a non-U.S. holder will comply with such procedures if it provides a properly executed IRS Form W-8BEN or W-8BEN-E (or other applicable Form W-8) or otherwise meets documentary evidence requirements for establishing that it is a non-U.S. holder, or otherwise establishes an exemption. Dividends paid to non-U.S. holders subject to withholding of U.S. federal income tax, as described above under the heading "—Dividends," will generally be exempt from U.S. backup withholding.

Information reporting and backup withholding generally will apply to the proceeds of a disposition of our common stock by a non-U.S. holder effected by or through the U.S. office of any broker, U.S. or foreign, unless the holder certifies its status as a non-U.S. holder and satisfies certain other requirements, or otherwise

establishes an exemption. Generally, information reporting and backup withholding will not apply to a payment of disposition proceeds to a non-U.S. holder where the transaction is effected outside the United States through a non-U.S. office of a broker. However, for information reporting purposes, dispositions effected through a non-U.S. office of a broker with substantial U.S. ownership or operations generally will be treated in a manner similar to dispositions effected through a U.S. office of a broker. Non-U.S. holders should consult their own tax advisors regarding the application of the information reporting and backup withholding rules to them.

Copies of information returns may be made available to the tax authorities of the country in which the non-U.S. holder resides or is incorporated under the provisions of a specific treaty or agreement.

Backup withholding is not an additional tax. Rather, any amounts withheld under the backup withholding rules from a payment to a non-U.S. holder can be refunded or credited against the non-U.S. holder's U.S. federal income tax liability, if any, provided that an appropriate claim is timely filed with the IRS.

FATCA

Sections 1471 to 1474 of the Code commonly referred to as the Foreign Account Tax Compliance Act, or FATCA, generally impose a 30% U.S. federal withholding tax on dividends on, and gross proceeds from the sale or other disposition of, our common stock if paid to a foreign entity unless (i) if the foreign entity is a "foreign financial institution," the foreign entity undertakes certain due diligence, reporting, withholding, and certification obligations, (ii) if the foreign entity is not a "foreign financial institution," the foreign entity identifies certain of its U.S. investors, or (iii) the foreign entity is otherwise excepted under FATCA.

Withholding under FATCA generally will apply to payments of dividends on our common stock. While under the applicable Treasury Regulations and administrative guidance, withholding under FATCA would also apply to payments of gross proceeds from a sale or other disposition of our common stock, under proposed U.S. Treasury Regulations, withholding on payments of gross proceeds is not required. Although such regulations are not final, the preamble to the proposed regulations specifies that taxpayers, including applicable withholding agents, are permitted to rely on such proposed regulations until final regulations are issued.

If withholding under FATCA is required on any payment related to our common stock, investors not otherwise subject to withholding (or that otherwise would be entitled to a reduced rate of withholding) on such payment may be required to seek a refund or credit from the IRS. An intergovernmental agreement between the United States and an applicable foreign country may modify the requirements described in this section. Non-U.S. holders should consult their own tax advisors regarding the possible implications of FATCA on their investment in our common stock and the entities through which they hold our common stock.

U.S. federal estate tax

Common stock owned or treated as owned by an individual who is a non-U.S. holder (as specially defined for U.S. federal estate tax purposes) at the time of death will be included in the individual's gross estate for U.S. federal estate tax purposes and, therefore, may be subject to U.S. federal estate tax, unless an applicable estate tax or other treaty provides otherwise. Non-U.S. holders are urged to consult their own tax advisors regarding the U.S. federal estate tax consequences of the ownership or disposition of our common stock.

The preceding discussion of material U.S. federal tax considerations is for prospective investors' information only. It is not tax advice. Prospective investors should consult their own tax advisors regarding their particular U.S. federal, state, local, and non-U.S. tax consequences of purchasing, holding, and disposing of our common stock.

Underwriting

We are offering the shares of common stock described in this prospectus through a number of underwriters. J.P. Morgan Securities LLC, Jefferies LLC, Guggenheim Securities, LLC and William Blair & Company, L.L.C. are acting as joint book-running managers of the offering and as representatives of the underwriters. We have entered into an underwriting agreement with the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus, the number of shares of common stock listed next to its name in the following table:

Name	Number of Shares
J.P. Morgan Securities LLC	5,754,674
Jefferies LLC	4,210,737
Guggenheim Securities, LLC	2,105,368
William Blair & Company, L.L.C.	1,965,010
Total	14,035,789

The underwriters are committed to purchase all the common shares offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters propose to offer the common shares directly to the public at the initial public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of $0.798 per share. After the initial offering of the shares to the public, if all of the shares of common stock are not sold at the initial public offering price, the underwriters may change the offering price and the other selling terms. Sales of any shares made outside of the United States may be made by affiliates of the underwriters.

The underwriters have an option to buy up to 2,105,368 additional shares of common stock from us to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have 30 days from the date of this prospectus to exercise this option to purchase additional shares. If any shares are purchased with this option to purchase additional shares, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriting fee is equal to the public offering price per share of common stock less the amount paid by the underwriters to us per share of common stock. The underwriting fee is $1.33 per share. The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	Without option to purchase additional shares exercise	With full option to purchase additional shares exercise
Per Share	$ 1.33	$ 1.33
Total	$ 18,667,599	$ 21,467,739

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be approximately $3.4 million. We have agreed to reimburse the underwriters for expenses relating to the clearance of this offering with the Financial Industry Regulatory Authority, Inc. in an amount up to $40,000.

A prospectus in electronic format may be made available on the web sites maintained by one or more underwriters, or selling group members, if any, participating in the offering. The underwriters may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

We have agreed that we will not (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend or otherwise transfer or dispose of, directly or indirectly, or submit to, or file with, the Securities and Exchange Commission a registration statement under the Securities Act relating to, any shares of our common stock or securities convertible into or exercisable or exchangeable for any shares of our common stock, or publicly disclose the intention to undertake the foregoing, or (ii) enter into any swap hedging or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of any shares of common stock or any such other securities (whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of common stock or such other securities, in cash or otherwise), without the prior written consent of J.P. Morgan Securities LLC, Jefferies LLC, Guggenheim Securities, LLC and William Blair & Company, L.L.C. for a period of 180 days after the date of this prospectus, other than the shares of our common stock to be sold in this offering.

The restrictions on our actions, as described above, do not apply to (i) the issuance of shares of common stock or securities convertible into or exercisable for shares of our common stock pursuant to the conversion or exchange of convertible or exchangeable securities or the exercise of warrants or options (including net exercise) or the settlement of RSUs (including net settlement), in each case outstanding on the date of the underwriting agreement and described in this prospectus; (ii) grants of stock options, stock awards, restricted stock, RSUs, or other equity awards and the issuance of shares of our common stock or securities convertible into or exercisable or exchangeable for shares of our common stock (whether upon the exercise of stock options or otherwise) to our employees, officers, directors, advisors, or consultants pursuant to the terms of an equity compensation plan in effect as of the closing of this offering and described in this prospectus, provided that such recipients enter into a lock-up agreement with the underwriters; (iii) our filing of any registration statement on Form S-8 relating to securities granted or to be granted pursuant to any plan in effect on the date of the underwriting agreement and described in this prospectus or any assumed benefit plan pursuant to an acquisition or similar strategic transaction; (iv) the issuance of shares of our common stock to The Broad Institute and the President and Fellows of Harvard College pursuant to our Cas9 License Agreement; or (v) shares of our common stock or other securities issued in connection with a transaction with an unaffiliated third party that includes a debt financing or a bona fide commercial relationship or any acquisition of assets or acquisition of not less than a majority or controlling portion of the equity of another entity, provided that (x) the aggregate number of shares issued pursuant to this clause (v) does not exceed 5% of the total number of outstanding shares of our common stock immediately following this offering and (y) such recipient enter into a lock-up agreement.

Our directors and executive officers, and substantially all of our stockholders (such persons, the “lock-up parties”) have entered into lock-up agreements with the underwriters prior to the commencement of this offering pursuant to which each lock-up party, with limited exceptions, for a period of 180 days after the date of this prospectus (such period, the “restricted period”), may not (and may not cause any of their direct or indirect affiliates to), without the prior written consent of J.P. Morgan Securities LLC, Jefferies LLC, Guggenheim Securities, LLC and William Blair & Company, L.L.C., (1) offer, pledge, sell, contract to sell, sell any option or

contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for our common stock (including, without limitation, common stock or such other securities which may be deemed to be beneficially owned by such lock-up parties in accordance with the rules and regulations of the SEC and securities which may be issued upon exercise of a stock option or warrant) (collectively with the common stock, the "lock-up securities")), (2) enter into any hedging, swap or other agreement or transaction that transfers, in whole or in part, any of the economic consequences of ownership of the lock-up securities, whether any such transaction described in clause (1) or (2) above is to be settled by delivery of lock-up securities, in cash or otherwise, (3) make any demand for or exercise any right with respect to, the registration of any lock-up securities, or (4) publicly disclose the intention to do any of the foregoing. Such persons or entities have acknowledged and agreed that the foregoing precludes them from engaging in any hedging or other transactions or arrangements (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) designed or intended, or which could reasonably be expected to lead to or result in, a sale or disposition or transfer (whether by the lock-up parties or any other person or entity) of any economic consequences of ownership, in whole or in part, directly or indirectly, of any lock-up securities, whether any such transaction or arrangement (or instrument provided for thereunder) would be settled by delivery of lock-up securities, in cash or otherwise.

The restrictions described in the immediately preceding paragraph and contained in the lock-up agreements between the underwriters and the lock-up parties do not apply, subject in certain cases to various conditions, to certain transactions, including (a) transfers or dispositions of lock-up securities: (i) as a bona fide gift or gifts, or for bona fide estate planning purposes, (ii) by will, other testamentary document or intestacy, (iii) to any trust for the direct or indirect benefit of the lock-up party or the immediate family of such lock-up party, or if the lock-up party is a trust, to a trustor or beneficiary of the trust or to the estate of a beneficiary of such trust (iv) to a corporation, partnership, limited liability company, trust or other entity of which the lock-up party and/ or one or more members of the immediate family of such lock-up party are, directly or indirectly, the legal and beneficial owner of all of the outstanding equity securities or similar interests, (v) to a nominee or custodian of a person or entity to whom a disposition or transfer would be permissible under clauses (i) through (iv) above, (vi) if the lock-up party 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 of the lock-up party, or to any investment fund or other entity controlling, controlled by, managing or managed by or under common control with the lock-up party or its affiliates, or (B) as part of a distribution or other transfer to general or limited partners, members or stockholders of, or other holders of equity in, the lock-up party; (vii) by operation of law, such as pursuant to a qualified domestic order, divorce settlement, divorce decree, separation agreement or court order, (viii) to us from an employee or other service provider of us upon death, disability or termination of employment or service relationship, in each case, of such employee or service provider, (ix) as part of a sale of a lock-up party's lock-up securities acquired in this offering (other than, in the case of an officer or director of us, any securities such officer or director may purchase in this offering) or in open market transactions after the completion of this offering, (x) to us in connection with the vesting, settlement or exercise of restricted stock units, options, warrants or other rights to purchase shares of our common stock (including, in each case, by way of "net" or "cashless" exercise), including for the payment of exercise price and tax and remittance payments due as a result of the vesting, settlement or exercise of such restricted stock units, options, warrants or rights, provided that any such shares of our common stock received upon such exercise, vesting or settlement shall be subject to the terms of such lock-up agreements, and provided further that any such restricted stock units, options, warrants or rights are held by the lock-up parties pursuant to an agreement or equity award granted under a stock incentive plan or other equity award plan or

other arrangement, each such agreement, plan or arrangement which is described in this prospectus, or (xi) pursuant to a bona fide third-party tender offer, merger, consolidation or other similar transaction that is approved by our board of directors and made to all stockholders involving a change in control, provided that if such transaction is not completed, all such lock-up securities would remain subject to the restrictions in the immediately preceding paragraph; provided that (A) in the case of any transfer, disposition or distribution pursuant to clause (a)(i), (ii), (iii), (iv), (v) and (vi), such transfer shall not involve a disposition for value and, each donee, devisee, transferee or distributee shall execute and deliver to the Representatives a lock-up letter, (B) in the case of any transfer or distribution pursuant to clause (a) (i), (ii), (iii), (iv), (v), (vi) and (ix), no filing by any party (donor, donee, devisee, transferor, transferee, distributer or distributee) under the Exchange Act, or other public announcement shall be required or shall be made voluntarily in connection with such transfer or distribution (other than a filing on a Form 5 or any required Schedule 13F, Schedule 13G or Schedule 13G/A, in each case made after the expiration of the restricted period referred to above) and (C) in the case of any transfer, disposition or distribution pursuant to clause (a) (vii), (viii) and (x) it shall be a condition to such transfer that no public filing, report or announcement shall be voluntarily made and if any filing under Section 16(a) of the Exchange Act, or other public filing, report or announcement reporting a reduction in beneficial ownership of common stock in connection with such transfer or distribution shall be legally required during the restricted period, such filing, report or announcement shall clearly indicate in the footnotes thereto the nature of such transfer; (b) exercise outstanding options, settle restricted stock units or other equity awards granted pursuant to plans or other equity compensation arrangements or exercise warrants, in each case described in this prospectus, provided that any lock-up securities received upon such exercise, vesting or settlement would be subject to restrictions similar to those in the immediately preceding paragraph; (c) exercise or convert outstanding preferred stock, warrants to acquire preferred stock or convertible securities or warrants to acquire shares of our common stock into shares of our common stock, provided that any such shares of common stock or warrants received upon such exercise or conversion would be subject to restrictions similar to those in the immediately preceding paragraph; and (d) the establishment by lock-up parties of trading plans under Rule 10b5-1 under the Exchange Act, provided that (1) such plans do not provide for the transfer or disposition of lock-up securities during the restricted period and (2) no filing by any party under the Exchange Act or other public announcement shall be required or made voluntarily in connection with such trading plan.

J.P. Morgan Securities LLC, Jefferies LLC, Guggenheim Securities, LLC and William Blair & Company, L.L.C., in their sole discretion, may release the securities subject to any of the lock-up agreements with the underwriters described above, in whole or in part at any time.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act.

At our request, the underwriters have reserved up to 3.0% of the shares of common stock being offered by this prospectus for sale, at the initial public offering price, to our officers, certain employees and other persons associated with us. Shares purchased by our officers and directors under our directed share program will be subject to a 180-day lock-up restriction. If these persons purchase reserved shares, it will reduce the number of shares available for sale to the general public. Any reserved shares that are not so purchased will be offered by the underwriters to the general public on the same terms as the other shares offered by this prospectus.

Our common stock has been approved for listing/quotation on the Nasdaq Global Select Market under the symbol “VERV”.

Prior to the date hereof, the cornerstone investors have indicated an interest, severally and not jointly, in purchasing up to an aggregate of $75 million in shares in this offering at the initial public offering price. Because this indication of interest is not a binding agreement or commitment to purchase, the cornerstone

investors may determine to purchase more, less or no shares in this offering or the underwriters may determine to sell more, less or no shares to any of the cornerstone investors. The underwriters will receive the same discount on any of our shares purchased by the cornerstone investors as they will from any other shares sold to the public in this offering.

In connection with this offering, the underwriters may engage in stabilizing transactions, which involves making bids for, purchasing and selling shares of common stock in the open market for the purpose of preventing or retarding a decline in the market price of the common stock while this offering is in progress. These stabilizing transactions may include making short sales of common stock, which involves the sale by the underwriters of a greater number of shares of common stock than they are required to purchase in this offering, and purchasing shares of common stock on the open market to cover positions created by short sales. Short sales may be "covered" shorts, which are short positions in an amount not greater than the underwriters' option to purchase additional shares referred to above, or may be "naked" shorts, which are short positions in excess of that amount. The underwriters may close out any covered short position either by exercising their option to purchase additional shares, in whole or in part, or by purchasing shares in the open market. In making this determination, the underwriters will consider, among other things, the price of shares available for purchase in the open market compared to the price at which the underwriters may purchase shares through the option to purchase additional shares. 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 that could adversely affect investors who purchase in this offering. To the extent that the underwriters create a naked short position, they will purchase shares in the open market to cover the position.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the common stock, including the imposition of penalty bids. This means that if the representatives of the underwriters purchase common stock in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on the Nasdaq Global Select Market, in the over-the-counter market or otherwise.

Prior to this offering, there has been no public market for our common stock. The initial public offering price was determined by negotiations between us and the representatives of the underwriters. In determining the initial public offering price, we and the representatives of the underwriters considered a number of factors including:

- the information set forth in this prospectus and otherwise available to the representatives;
- our prospects and the history and prospects for the industry in which we compete;
- an assessment of our management;
- our prospects for future earnings;
- the general condition of the securities markets at the time of this offering;
- the recent market prices of, and demand for, publicly traded common stock of generally comparable companies; and

- other factors deemed relevant by the underwriters and us.

Neither we nor the underwriters can assure investors that an active trading market will develop for our common shares, or that the shares will trade in the public market at or above the initial public offering price.

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus may not be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus. This prospectus does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

Other relationships

Certain of the underwriters and their affiliates have provided in the past to us and our affiliates and may provide from time to time in the future certain commercial banking, financial advisory, investment banking and other services for us and such affiliates in the ordinary course of their business, for which they have received and may continue to receive customary fees and commissions. In addition, from time to time, certain of the underwriters and their affiliates may effect transactions for their own account or the account of customers, and hold on behalf of themselves or their customers, long or short positions in our debt or equity securities or loans, and may do so in the future.

Selling restrictions

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus may not be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus. This prospectus does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

Notice to prospective investors in Canada

The shares may be sold 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 from, 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 for particulars 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.

Notice to prospective investors in the European Economic Area

In relation to each Member State of the European Economic Area (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 the shares may be offered to the public in that Relevant State at any time:

(a) to any legal entity which is a qualified investor as defined under Article 2 of the Prospectus Regulation;

(b) to fewer than 150 natural or legal persons (other than qualified investors as defined under Article 2 of the Prospectus Regulation), subject to obtaining the prior consent of 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 the 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 the 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.

Notice to prospective investors in the United Kingdom

No shares have been offered or will be offered pursuant to the offering to the public in the United Kingdom prior to the publication of a prospectus in relation to the Shares which has been approved by the Financial Conduct Authority, except that the shares may be offered to the public in the United Kingdom at any time:

(a) to any legal entity which is a qualified investor as defined under Article 2 of the UK Prospectus Regulation;

(b) to fewer than 150 natural or legal persons (other than qualified investors as defined under Article 2 of the UK Prospectus Regulation), subject to obtaining the prior consent of the representatives for any such offer; or

(c) in any other circumstances falling within Section 86 of the FSMA.

provided that no such offer of the shares shall require us or any underwriter to publish a prospectus pursuant to Section 85 of the FSMA or supplement a prospectus pursuant to Article 23 of the UK Prospectus Regulation. For the purposes of this provision, the expression an "offer to the public" in relation to the shares in the United Kingdom 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 "UK Prospectus Regulation" means Regulation (EU) 2017/1129 as it forms part of domestic law by virtue of the European Union (Withdrawal) Act 2018.

Notice to prospective investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange, or SIX or on any other stock exchange or regulated trading facility in Switzerland. This document does not constitute a prospectus within the meaning of, and has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company or the shares have been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA, and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes, or CISA. The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Notice to prospective investors in the Dubai International Financial Centre

This document relates to an Exempt Offer in accordance with the Markets Rules 2012 of the Dubai Financial Services Authority, or DFSA. This document is intended for distribution only to persons of a type specified in the Markets Rules 2012 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 supplement nor taken steps to verify the information set forth herein and has no responsibility for this document. The securities to which this document relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the securities offered should conduct their own due diligence on the securities. If you do not understand the contents of this document you should consult an authorized financial advisor.

In relation to its use in the Dubai International Financial Centre, or DIFC, this document is strictly private and confidential and is being distributed to a limited number of investors and must not be provided to any person other than the original recipient, and may not be reproduced or used for any other purpose. The interests in the securities may not be offered or sold directly or indirectly to the public in the DIFC.

Notice to prospective investors in the United Arab Emirates

The shares have not been, and are not being, publicly offered, sold, promoted or advertised in the United Arab Emirates (including the DIFC) other than in compliance with the laws of the United Arab Emirates (and the DIFC) governing the issue, offering and sale of securities. Further, this prospectus does not constitute a public offer of securities in the United Arab Emirates (including the DIFC) and is not intended to be a public offer. This prospectus has not been approved by or filed with the Central Bank of the United Arab Emirates, the Securities and Commodities Authority or the DFSA.

Notice to prospective investors in Australia

This prospectus:

- does not constitute a disclosure document or a prospectus under Chapter 6D.2 of the Corporations Act 2001, or the Corporations Act;
- has not been, and will not be, lodged with the Australian Securities and Investments Commission, or ASIC, as a disclosure document for the purposes of the Corporations Act and does not purport to include the information required of a disclosure document for the purposes of the Corporations Act; and

- may only be provided in Australia to select investors who are able to demonstrate that they fall within one or more of the categories of investors, available under section 708 of the Corporations Act, or Exempt Investors.

The shares may not be directly or indirectly offered for subscription or purchased or sold, and no invitations to subscribe for or buy the shares may be issued, and no draft or definitive offering memorandum, advertisement or other offering material relating to any shares may be distributed in Australia, except where disclosure to investors is not required under Chapter 6D of the Corporations Act or is otherwise in compliance with all applicable Australian laws and regulations. By submitting an application for the shares, you represent and warrant to us that you are an Exempt Investor.

As any offer of shares under this document will be made without disclosure in Australia under Chapter 6D.2 of the Corporations Act, the offer of those securities for resale in Australia within 12 months may, under section 707 of the Corporations Act, require disclosure to investors under Chapter 6D.2 if none of the exemptions in section 708 applies to that resale. By applying for the shares you undertake to us that you will not, for a period of 12 months from the date of issue of the shares, offer, transfer, assign or otherwise alienate those shares to investors in Australia except in circumstances where disclosure to investors is not required under Chapter 6D.2 of the Corporations Act or where a compliant disclosure document is prepared and lodged with ASIC.

Notice to prospective investors in Japan

The shares have not been and will not be registered pursuant to Article 4, Paragraph 1 of the Financial Instruments and Exchange Act. Accordingly, none of the shares nor any interest therein may be offered or sold, directly or indirectly, in Japan or to, or for the benefit of, any “resident” of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan), or to others for re-offering or resale, directly or indirectly, in Japan or to or for the benefit of a resident of Japan, except pursuant to an exemption from the registration requirements of, and otherwise in compliance with, the Financial Instruments and Exchange Act and any other applicable laws, regulations and ministerial guidelines of Japan in effect at the relevant time.

Notice to prospective investors in Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (a) to “professional investors” as defined in the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong), or the SFO, of Hong Kong and any rules made thereunder; or (b) in other circumstances which do not result in the document being a “prospectus” as defined in the Companies (Winding Up and Miscellaneous Provisions) Ordinance (Cap. 32) of Hong Kong, or the CO or which do not constitute an offer to the public within the meaning of the CO. No advertisement, invitation or document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, 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 of 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” as defined in the SFO and any rules made thereunder.

Notice to prospective investors in Singapore

Each joint book-running manager has acknowledged that this prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, each joint book-running manager has represented and agreed that it has not offered or sold any shares or caused the shares to be made the subject of an invitation for subscription or purchase and will not offer or sell any shares or cause the shares to be made the subject of an invitation for subscription or purchase, and has not circulated or distributed, nor will it

circulate or distribute, this prospectus or any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares, whether directly or indirectly, to any person in Singapore other than:

(a) to an institutional investor (as defined in Section 4A of the Securities and Futures Act (Chapter 289) of Singapore, as modified or amended from time to time, or the SFA) pursuant to Section 274 of the SFA;

(b) 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

(c) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

(a) 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; or

(b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor,

securities or securities-based derivatives contracts (each term as defined in Section 2(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

(i) to an institutional investor or to a relevant person, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;

(ii) where no consideration is or will be given for the transfer;

(iii) where the transfer is by operation of law;

(iv) as specified in Section 276(7) of the SFA; or

(v) as specified in Regulation 37A of the Securities and Futures (Offers of Investments) (Securities and Securities-based Derivatives Contracts) Regulations 2018.

Singapore SFA Product Classification—In connection with Section 309B of the SFA and the CMP Regulations 2018, unless otherwise specified before an offer of Notes, we have determined, and hereby notify all relevant persons (as defined in Section 309A(1) of the SFA), 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).

Notice to prospective investors in Bermuda

Shares may be offered or sold in Bermuda only in compliance with the provisions of the Investment Business Act of 2003 of Bermuda which regulates the sale of securities in Bermuda. Additionally, non-Bermudian persons (including companies) may not carry on or engage in any trade or business in Bermuda unless such persons are permitted to do so under applicable Bermuda legislation.

Notice to prospective investors in Saudi Arabia

This document may not be distributed in the Kingdom of Saudi Arabia except to such persons as are permitted under the Offers of Securities Regulations as issued by the board of the Saudi Arabian Capital Market Authority, or CMA pursuant to resolution number 2-11-2004 dated 4 October 2004 as amended by resolution number 1-28-2008, as amended. The CMA does not make any representation as to the accuracy or completeness of this document and expressly disclaims any liability whatsoever for any loss arising from, or incurred in reliance upon, any part of this document. Prospective purchasers of the securities offered hereby should conduct their own due diligence on the accuracy of the information relating to the securities. If you do not understand the contents of this document, you should consult an authorized financial adviser.

Notice to prospective investors in the British Virgin Islands

The shares are not being, and may not be offered to the public or to any person in the British Virgin Islands for purchase or subscription by or on our behalf. The shares may be offered to companies incorporated under the BVI Business Companies Act, 2004 (British Virgin Islands), or BVI Companies, but only where the offer will be made to, and received by, the relevant BVI Company entirely outside of the British Virgin Islands.

Notice to prospective investors in China

This prospectus will not be circulated or distributed in the PRC and the shares will not be offered or sold, and will not be offered or sold to any person for re-offering or resale directly or indirectly to any residents of the PRC except pursuant to any applicable laws and regulations of the PRC. Neither this prospectus nor any advertisement or other offering material may be distributed or published in the PRC, except under circumstances that will result in compliance with applicable laws and regulations.

Notice to prospective investors in Korea

The shares have not been and will not be registered under the Financial Investments Services and Capital Markets Act of Korea and the decrees and regulations thereunder, or the FSCMA, and the shares have been and will be offered in Korea as a private placement under the FSCMA. None of the shares may be offered, sold or delivered directly or indirectly, or offered or sold to any person for re-offering or resale, directly or indirectly, in Korea or to any resident of Korea except pursuant to the applicable laws and regulations of Korea, including the FSCMA and the Foreign Exchange Transaction Law of Korea and the decrees and regulations thereunder, or the FETL. The shares have not been listed on any of securities exchanges in the world including, without limitation, the Korea Exchange in Korea. Furthermore, the purchaser of the shares shall comply with all applicable regulatory requirements (including but not limited to requirements under the FETL) in connection with the purchase of the shares. By the purchase of the shares, the relevant holder thereof will be deemed to represent and warrant that if it is in Korea or is a resident of Korea, it purchased the shares pursuant to the applicable laws and regulations of Korea.

Notice to prospective investors in Malaysia

No prospectus or other offering material or document in connection with the offer and sale of the shares has been or will be registered with the Securities Commission of Malaysia, or Commission, for the Commission's approval pursuant to the Capital Markets and Services Act 2007. 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 Malaysia other than (i) a closed end fund approved by the Commission; (ii) a holder of a Capital Markets Services Licence; (iii) a person who acquires the shares, as principal, if the offer is on terms that the shares may only be acquired at a

consideration of not less than RM250,000 (or its equivalent in foreign currencies) for each transaction; (iv) an individual whose total net personal assets or total net joint assets with his or her spouse exceeds RM3 million (or its equivalent in foreign currencies), excluding the value of the primary residence of the individual; (v) an individual who has a gross annual income exceeding RM300,000 (or its equivalent in foreign currencies) per annum in the preceding twelve months; (vi) an individual who, jointly with his or her spouse, has a gross annual income of RM400,000 (or its equivalent in foreign currencies), per annum in the preceding twelve months; (vii) a corporation with total net assets exceeding RM10 million (or its equivalent in a foreign currencies) based on the last audited accounts; (viii) a partnership with total net assets exceeding RM10 million (or its equivalent in foreign currencies); (ix) a bank licensee or insurance licensee as defined in the Labuan Financial Services and Securities Act 2010; (x) an Islamic bank licensee or takaful licensee as defined in the Labuan Financial Services and Securities Act 2010; and (xi) any other person as may be specified by the Commission; provided that, in the each of the preceding categories (i) to (xi), the distribution of the shares is made by a holder of a Capital Markets Services Licence who carries on the business of dealing in securities. The distribution in Malaysia of this prospectus is subject to Malaysian laws. This prospectus does not constitute and may not be used for the purpose of public offering or an issue, offer for subscription or purchase, invitation to subscribe for or purchase any securities requiring the registration of a prospectus with the Commission under the Capital Markets and Services Act 2007.

Notice to prospective investors in Taiwan

The shares have not been and will not be registered with the Financial Supervisory Commission of Taiwan pursuant to relevant securities laws and regulations and may not be sold, issued or offered within Taiwan through a public offering or in circumstances which constitutes an offer within the meaning of the Securities and Exchange Act of Taiwan that requires a registration or approval of the Financial Supervisory Commission of Taiwan. No person or entity in Taiwan has been authorized to offer, sell, give advice regarding or otherwise intermediate the offering and sale of the shares in Taiwan.

Notice to prospective investors in South Africa

Due to restrictions under the securities laws of South Africa, no “offer to the public” (as such term is defined in the South African Companies Act, No. 71 of 2008 (as amended or re-enacted), or the South African Companies Act) is being made in connection with the issue of the shares in South Africa. Accordingly, this document does not, nor is it intended to, constitute a “registered prospectus” (as that term is defined in the South African Companies Act) prepared and registered under the South African Companies Act and has not been approved by, and/or filed with, the South African Companies and Intellectual Property Commission or any other regulatory authority in South Africa. The shares are not offered, and the offer shall not be transferred, sold, renounced or delivered, in South Africa or to a person with an address in South Africa, unless one or other of the following exemptions stipulated in section 96 (1) applies:

Section 96 (1) (a)	the offer, transfer, sale, renunciation or delivery is to:
	(i) persons whose ordinary business, or part of whose ordinary business, is to deal in securities, as principal or agent;
	(ii) the South African Public Investment Corporation;
	(iii) persons or entities regulated by the Reserve Bank of South Africa;
	(iv) authorised financial service providers under South African law;
	(v) financial institutions recognised as such under South African law;

	(vi) a wholly owned subsidiary of any person or entity contemplated in (c), (d) or (e), acting as agent in the capacity of an authorised portfolio manager for a pension fund, or as manager for a collective investment scheme (in each case duly registered as such under South African law); or
	(vii) any combination of the person in (i) to (vi); or
Section 96 (1) (b)	the total contemplated acquisition cost of the securities, for any single addressee acting as principal is equal to or greater than ZAR1,000,000 or such higher amount as may be promulgated by notice in the Government Gazette of South Africa pursuant to section 96(2) (a) of the South African Companies Act.

Information made available in this prospectus should not be considered as "*advice*" as defined in the South African Financial Advisory and Intermediary Services Act, 2002.

Notice to prospective investors in Israel

This document does not constitute a prospectus under the Israeli Securities Law, 5728-1968, or the Securities Law, and has not been filed with or approved by the Israel Securities Authority. In Israel, this prospectus is being distributed only to, and is directed only at, and any offer of the shares is directed only at, (i) a limited number of persons in accordance with the Israeli Securities Law and (ii) investors listed in the first addendum, or the Addendum, to the Israeli Securities Law, consisting primarily of joint investment in trust funds, provident funds, insurance companies, banks, portfolio managers, investment advisors, members of the Tel Aviv Stock Exchange, underwriters, venture capital funds, entities with equity in excess of NIS 50 million and "qualified individuals," each as defined in the Addendum (as it may be amended from time to time), collectively referred to as qualified investors (in each case, purchasing for their own account or, where permitted under the Addendum, for the accounts of their clients who are investors listed in the Addendum). Qualified investors are required to submit written confirmation that they fall within the scope of the Addendum, are aware of the meaning of same and agree to it.

Legal matters

The validity of the shares of common stock offered hereby is being passed upon for us by Wilmer Cutler Pickering Hale and Dorr LLP, Boston, Massachusetts. Cooley LLP, Washington, DC, is acting as counsel for the underwriters in connection with this offering.

Experts

The consolidated financial statements of Verve Therapeutics, Inc. at December 31, 2020 and 2019, and for each of the two years in the period ended December 31, 2020, appearing in this Prospectus and Registration Statement have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon appearing elsewhere herein, and are included in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

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 common stock we are offering to sell. This prospectus, which constitutes part of the registration statement, does not include all of the information contained in the registration statement and the exhibits, schedules and amendments to the registration statement. For further information with respect to us and our common stock, we refer you to the registration statement and to the exhibits and schedules to the registration statement. Statements contained in this prospectus about the contents of any contract, agreement or other document are not necessarily complete, and, in each instance, we refer you to the copy of the contract, agreement or other document filed as an exhibit to the registration statement. Each of these statements is qualified in all respects by this reference to such contract, agreement or document.

The SEC maintains a website, which is located at http://www.sec.gov, that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC. You may access the registration statement of which this prospectus is a part at the SEC's website. Upon completion of this offering, we will be subject to the information reporting requirements of the Securities Exchange Act of 1934, as amended, and we will file reports, proxy statements and other information with the SEC. We plan to fulfill our obligations with respect to such requirements by filing periodic reports and other information with the SEC. We intend to furnish our stockholders with annual reports containing financial statements certified by an independent registered public accounting firm. Our website address is www.vervetx.com. The information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

Index to consolidated financial statements

Report of independent registered public accounting firm

To the Stockholders and the Board of Directors of Verve Therapeutics, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of Verve Therapeutics, Inc. (the Company) as of December 31, 2020 and 2019, the related consolidated statements of operations and comprehensive loss, convertible preferred stock and stockholders' deficit and cash flows for each of the two years in the period ended December 31, 2020, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2020, in conformity with U.S. generally accepted accounting principles.

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 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. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

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/ Ernst & Young LLP

We have served as the Company's auditor since 2020.
Boston, Massachusetts
April 16, 2021, except for Note 17(E), as to which the date is June 14, 2021

Verve Therapeutics, Inc.
Consolidated balance sheets

(in thousands, except share and per share amounts)	December 31, 2020	December 31, 2019
Assets		
Current assets:		
Cash and cash equivalents	$ 8,993	$ 2,986
Marketable securities	63,119	15,796
Prepaid expenses and other current assets	1,854	272
Total current assets	73,966	19,054
Property and equipment, net	3,984	2,358
Restricted cash	463	235
Total assets	$ 78,413	$ 21,647
Liabilities, convertible preferred stock, and stockholders' deficit		
Current liabilities:		
Accounts payable	$ 36	$ 2,411
Accrued expenses	7,189	1,111
Deferred rent, current portion	90	31
Total current liabilities	7,315	3,553
Deferred rent, net of current portion	125	132
Preferred stock tranche liability	—	9,571
Success payment liability (See Note 8 and Note 15)	2,806	419
Antidilution rights liability (See Note 8 and Note 15)	6,916	2,044
Other liabilities	—	1
Total liabilities	17,162	15,720
Commitments and contingencies (See Note 7 and Note 8)		
Convertible preferred stock (See Note 10)	125,160	25,480
Stockholders' deficit:		
Common stock, $0.001 par value; 255,000,000 and 164,016,724 shares authorized, 3,123,424 and 2,929,707 shares issued at December 31, 2020 and 2019, respectively; 2,585,789 and 1,854,438 shares outstanding at December 31, 2020 and 2019, respectively	3	2
Additional paid-in capital	2,616	1,268
Accumulated other comprehensive income	8	9
Accumulated deficit	(66,536)	(20,832)
Total stockholders' deficit	(63,909)	(19,553)
Total liabilities, convertible preferred stock, and stockholders' deficit	$ 78,413	$ 21,647

The accompanying notes are an integral part of these consolidated financial statements.

Verve Therapeutics, Inc.
Consolidated statements of operations and comprehensive loss

(in thousands, except share and per share amounts)	Year ended December 31, 2020	2019
Operating expenses:		
Research and development	$ 35,371	$ 11,144
General and administrative	5,256	2,498
Total operating expenses	40,627	13,642
Loss from operations	(40,627)	(13,642)
Other income (expense):		
Change in fair value of preferred stock tranche liability	2,507	(4,883)
Change in fair value of antidilution rights liability	(5,359)	(982)
Change in fair value of success payment liability	(2,387)	(68)
Interest income and other income (expense), net	162	278
Total other (expense) income, net	(5,077)	(5,655)
Net loss	$ (45,704)	$ (19,297)
Net loss per common share attributable to common stockholders, basic and diluted	$ (20.31)	$ (15.11)
Weighted-average common shares used in net loss per share attributable to common stockholders, basic and diluted	2,250,093	1,277,156
Comprehensive Loss:		
Net loss	$ (45,704)	$ (19,297)
Other comprehensive (loss) income:		
Unrealized (loss) gain on marketable securities	(1)	9
Comprehensive loss	$ (45,705)	$ (19,288)

The accompanying notes are an integral part of these consolidated financial statements.

Verve Therapeutics, Inc.
Consolidated statements of convertible preferred stock and stockholders' deficit

(in thousands, except share amounts)	Convertible preferred stock		Common stock		Additional paid-in capital	Accumulated other comprehensive income	Accumulated deficit	Total stockholders' deficit
	Shares	Amount	Shares	Amount				
Balance at December 31, 2018	19,565,217	$ 6,905	537,635	$ —	$ 51	$ —	$ (1,535)	$ (1,484)
Issuance of Series A convertible preferred stock, net of issuance costs of $10 and tranche right liability of $84	30,183,947	17,956	—	—	—	—	—	—
Issuance of Series A Preferred Stock in payment of licensing fee	1,672,240	619	—	—	—	—	—	—
Issuance of common stock to licensor institutions	—	—	673,562	1	747	—	—	748
Vesting of restricted common stock	—	—	643,241	1	—	—	—	1
Repayment of shareholder loan	—	—	—	—	24	—	—	24
Unrealized gain on available-for-sale securities	—	—	—	—	—	9	—	9
Stock-based compensation	—	—	—	—	446	—	—	446
Net loss	—	—	—	—	—	—	(19,297)	(19,297)
Balance at December 31, 2019	51,421,404	25,480	1,854,438	2	1,268	9	(20,832)	(19,553)
Issuance of Series A convertible preferred stock and settlement of tranche right liability of $7.0 million, net of issuance costs of $22	49,749,167	36,792	—	—	—	—	—	—
Issuance of Series A-2 convertible preferred stock, net of issuance costs of $112	78,348,461	62,888	—	—	—	—	—	—
Additional issuances of common stock to licensor institutions	—	—	187,867	—	487	—	—	487
Vesting of restricted common stock	—	—	537,635	1	—	—	—	1
Unrealized loss on available-for-sale securities	—	—	—	—	—	(1)	—	(1)
Stock-based compensation	—	—	—	—	850	—	—	850
Exercise of common stock options	—	—	5,849	—	11	—	—	11
Net loss	—	—	—	—	—	—	(45,704)	(45,704)
Balance at December 31, 2020	179,519,032	$125,160	2,585,789	$ 3	$ 2,616	$ 8	$ (66,536)	$ (63,909)

The accompanying notes are an integral part of these consolidated financial statements.

Verve Therapeutics, Inc.
Consolidated statements of cash flows

(in thousands)	Year ended December 31, 2020	2019
Cash flows from operating activities:		
Net loss	$(45,704)	$(19,297)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	1,328	106
Non-cash research and development license expense	—	2,781
Amortization (accretion) of premium (discount) on marketable securities	380	(72)
Stock-based compensation	850	446
Change in fair value of preferred stock tranche liabilities	(2,507)	4,883
Change in fair value of antidilution rights	5,359	982
Change in fair value of success payments liabilities	2,387	68
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	(1,582)	(182)
Accounts payable	(1,898)	1,735
Accrued expenses and other liabilities	6,071	945
Deferred rent liability	51	163
Net cash used in operating activities	(35,265)	(7,442)
Cash flows from investing activities:		
Purchases of property and equipment	(3,424)	(1,857)
Purchases of marketable securities	(98,484)	(22,001)
Maturities of marketable securities	50,781	11,100
Net cash used in investing activities	(51,127)	(12,758)
Cash flows from financing activities		
Proceeds from issuance of Series A Preferred Stock, net	29,728	18,040
Proceeds from issuance of Series A-2 Preferred Stock, net	62,888	—
Shareholder loan given	—	(110)
Proceeds from exercise of stock options	11	—
Payments received on shareholder loan	—	24
Net cash provided by financing activities	92,627	17,954
Increase (decrease) in cash, cash equivalents and restricted cash	6,235	(2,246)
Cash, cash equivalents and restricted cash—beginning of period	3,221	5,467
Cash, cash equivalents and restricted cash—end of period	$ 9,456	$ 3,221
Supplemental disclosure of noncash investing activities:		
Property and equipment additions included in accounts payable and accrued expenses	$ 86	$ 556
Supplemental disclosures of noncash financing activities:		
Issuance of preferred stock tranche liability	$ —	$ 84
Settlement of tranche right liability	$ 7,064	$ —
Partial settlement of derivative liability by issuing common stock	$ 486	$ 135

The accompanying notes are an integral part of these consolidated financial statements.

Verve Therapeutics, Inc.
Notes to consolidated financial statements

1. Nature of the business and basis of presentation

Organization

Verve Therapeutics, Inc. (the “Company” or “Verve”) is a genetic medicines company pioneering a new approach to the care of cardiovascular disease, transforming treatment from chronic management to single-course gene editing medicines. The Company was incorporated on March 9, 2018 as Endcadia, Inc., a Delaware corporation, and began operations shortly thereafter. In January 2019, the Company amended its certificate of incorporation to change its name to Verve Therapeutics, Inc. The Company’s principal offices are located in Cambridge, Massachusetts.

Since its inception, the Company has devoted its efforts principally to research and development and raising capital. The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry including, but not limited to, technical risks associated with the successful research, development and manufacturing of product candidates, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations and the ability to secure additional capital to fund operations. Current and future programs will require significant research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if the Company’s development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

Basis of presentation and liquidity

The accompanying consolidated financial statements have been prepared in accordance with United States generally accepted accounting principles (“GAAP”). Any reference in these notes to applicable guidance is meant to refer to the authoritative GAAP as found in the Accounting Standards Codification (“ASC”) and Accounting Standards Update (“ASU”) of the Financial Accounting Standards Board (“FASB”). The accompanying consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities and commitments in the ordinary course of business. The Company has incurred losses since its inception, including losses of $45.7 million and $19.3 million for the years ended December 31, 2020 and 2019, respectively. As of December 31, 2020, the Company had an accumulated deficit of $66.5 million. To date, the Company has funded its operations primarily with proceeds from the sale of preferred stock. The Company expects to generate operating losses and negative operating cash flows for the foreseeable future.

The Company expects that its cash, cash equivalents and marketable securities as of December 31, 2020, along with $94.0 million in gross proceeds from its convertible Series B Preferred Stock (“Series B Preferred”) financing in January 2021, will be sufficient to fund its operations for at least the next twelve months from the date of issuance of these financial statements. The Company will need additional financing to support its continuing operations and pursue its growth strategy. Until such time as the Company can generate significant revenue from product sales, if ever, it expects to finance its operations through a combination of equity offerings, debt financings, collaborations, strategic alliances and licensing arrangements. The Company may be unable to raise additional funds or enter into such other agreements when needed on favorable terms or at all. The inability to raise capital as and when needed could have a negative impact on the Company’s financial condition and its ability to pursue its business strategy. The Company will need to generate significant revenue to achieve profitability, and it may never do so.

The Company is seeking to complete an initial public offering ("IPO") of its common stock. Upon the completion of a qualified public offering on specified terms, the Company's outstanding convertible preferred stock will automatically convert into shares of common stock (see Note 11, Common Stock).

2. Summary of significant accounting policies

Principles of consolidation

The accompanying consolidated financial statements include the accounts of Verve and its wholly owned subsidiary, Verve Securities Corporation. All intercompany transactions and balances have been eliminated in consolidation.

Use of estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities and expenses, and the disclosure of contingent assets and liabilities as of and during the reporting period. The Company bases its estimates and assumptions on historical experience when available and on various factors that it believes to be reasonable under the circumstances. Significant estimates and assumptions reflected in these consolidated financial statements include, but are not limited to, the fair values of common stock, convertible preferred stock, preferred stock tranche liability, stock-based compensation, and the liabilities for antidilution rights and success payments. Actual results could differ from these estimates.

Cash and cash equivalents

Cash and cash equivalents consist of standard checking accounts and money market account funds that invest primarily in U.S. government-backed securities and treasuries. The Company considers all highly liquid investments with an original maturity of three months or less at the date of purchase to be cash equivalents. Cash equivalents are stated at cost, which is substantially equivalent to fair value.

Restricted cash

Restricted cash represents collateral provided for a letter of credit issued as a security deposit in connection with the Company's lease of its corporate facilities. A reconciliation of the cash, cash equivalents, and restricted cash reported within the balance sheet that sum to the total of the same amounts shown in the statement of cash flows is as follows:

	December 31,	
(in thousands)	**2020**	**2019**
Cash and cash equivalents	$8,993	$2,986
Restricted cash	463	235
Total cash, cash equivalents and restricted cash	$9,456	$3,221

Marketable securities

The Company classifies marketable securities with a remaining maturity when purchased of greater than three months as available-for-sale. Available-for-sale securities are maintained by the Company's investment managers and consist of U.S. treasury bills and U.S agency securities. Available-for-sale securities are carried at fair value with the unrealized gains and losses included in accumulated other comprehensive income as a component of stockholders' equity until realized. Any premium or discount arising at purchase is amortized and/or accreted to interest income and/or expense over the life of the instrument. Realized gains and losses are determined using the specific identification method and are included in other income (expense).

Concentrations of credit risk

Financial instruments that potentially subject the Company to significant concentration of credit risk consist primarily of cash, cash equivalents and restricted cash. Periodically, the Company may maintain deposits in financial institutions in excess of government insured limits. Management believes that the Company is not exposed to significant credit risk as the Company's deposits are held at financial institutions that management believes to be of high credit quality, and the Company has not experienced any losses on these deposits.

Deferred offering costs

The Company capitalizes incremental legal, professional accounting and other third-party fees that are directly associated with the planned IPO as other non-current assets until the IPO is consummated. After consummation of the IPO, these costs will be recorded in stockholders' deficit as a reduction of additional paid-in-capital generated as a result of the offering. If the Company terminates its plan for an IPO, any costs deferred will be expensed immediately. As of December 31, 2020, there were no deferred offering costs.

Indemnification agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to vendors, lessors, contract research organizations, business partners and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third parties. In addition, the Company has entered into indemnification agreements with members of its board of directors and its executive officers that will 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. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, unlimited. The Company has not incurred any material costs as a result of such indemnifications and is not currently aware of any indemnification claims.

Fair value of financial instruments

ASC Topic 820, *Fair Value Measurement* ("ASC 820"), establishes a fair value hierarchy for instruments measured at fair value that distinguishes between assumptions based on market data (observable inputs) and the Company's own assumptions (unobservable inputs). Observable inputs are inputs that market participants would use in pricing the asset or liability based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the inputs that market participants would use in pricing the assets or liability and are developed based on the best information available in the circumstances. ASC 820 identifies fair value as the price that would be received to sell an asset or paid to transfer a liability, in an orderly transaction between market participants at the measurement date. As a basis for considering market participant assumptions in fair value measurements, ASC 820 establishes a three-tiered value hierarchy that distinguishes between the following:

Level 1—Quoted market prices in active markets for identical assets or liabilities.

Level 2—Inputs other than Level 1 inputs that are either directly or indirectly observable, such as quoted market prices, interest rates and yield curves.

Level 3—Unobservable inputs for the asset or liability (i.e. supported by little or no market activity). Level 3 inputs include management's own assumptions about the assumptions that market participants would use in pricing the asset or liability (including assumptions about risk).

To the extent the valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair values requires more judgement. Accordingly, the degree of judgement exercised by the Company in determining fair value is greatest for instruments categorized as Level 3. A financial instrument's level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement.

There have been no changes to the valuation methods utilized by the Company during the years ended December 31, 2020 and 2019. The Company evaluates transfers between levels at the end of each reporting period. There were no transfers of financial instruments between levels during the years ended December 31, 2020 and 2019.

Property and equipment, net

Property and equipment are stated at cost less accumulated depreciation. Depreciation expense is recognized using the straight-line method over the estimated useful life of each asset as follows:

Asset category	Estimated useful life
Computer equipment and software	3 years
Office furniture	4 years
Laboratory equipment	5 years
Leasehold improvements	Shorter of useful life or remaining lease term

Upon retirement or sale, the cost of assets disposed of and the related accumulated depreciation are removed from the accounts and any resulting gain or loss is included in loss from operations. Expenditures for repairs and maintenance are charged to expense as incurred.

Impairment of long-lived assets

The Company evaluates its long-lived assets, which consist primarily of property and equipment, for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to the future undiscounted net cash flows expected to be generated by the asset. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the asset exceeds the fair value of the asset. There were no impairment losses recognized during the years ended December 31, 2020 and 2019.

Freestanding financial instruments and derivatives

The Company has identified the following financial instruments, which are recorded as liabilities in the balance sheet and separately accounted for at fair value.

Preferred Stock Tranche Liabilities—The Company has determined that its obligation to issue, and the Company's investors' right to purchase, additional shares of convertible Series A Preferred Stock ("Series A Preferred") pursuant to subsequent closings represent a freestanding financial instrument. The freestanding preferred stock tranche liability (the "tranche liability") was initially recorded at fair value, with gains and losses arising from changes in fair value recognized in other income (expense) in the statement of operations and comprehensive loss. The tranche liabilities were remeasured at each reporting period and upon the exercise or expiration of the obligation. As of December 31, 2020, all Series A Preferred closings occurred, and all preferred stock tranche liabilities have been settled. Refer to Note 9, Preferred Stock tranche liability, for additional discussion.

Pursuant to license agreements with (i) the President and Fellows of Harvard College ("Harvard") and The Broad Institute, Inc. ("Broad") ("Harvard/Broad License Agreement") and (ii) Broad ("Broad License Agreement") (see Note 8, License agreements), the following financial instruments were issued by the Company.

Antidilution Rights—The antidilution rights represent the obligation to issue additional shares of common stock to Harvard and Broad following the completion of additional financings, including the Company's initial public offering. These antidilution rights were accounted for under ASC 815 and were initially recorded at fair value with a corresponding charge to research and development expense. The liability is remeasured at each reporting period, with changes in fair value recognized in other income (expense) in the statement of operations and comprehensive loss while this instrument is outstanding. Refer to Note 5, Fair value of financial instruments, for additional discussion.

Success Payments—The Company is obligated to pay to Harvard and Broad tiered success payments in the event the Company's average market capitalization exceeds specified thresholds ascending from a high nine digit dollar amount to $10.0 billion, or sale of the company for consideration in excess of those thresholds. In the event of a change of control of the Company or a sale of the Company, the Company is required to pay in cash within a specified period following such event. Otherwise, the payments may be settled at the Company's option in either cash or shares of the Company's common stock. The success payments are accounted for under ASC 815 and are initially recorded at fair value with a corresponding charge to research and development expense. The liability is remeasured at each reporting period with all changes in value recognized in other income (expense) in the statement of operations and other comprehensive loss. The Company will continue to adjust the liability for changes in fair value until the earlier of the achievement or expiration of the success payment obligation. Refer to Note 5, Fair value of financial instruments, for additional discussion.

Convertible preferred stock

The Company has classified convertible preferred stock as temporary equity in the accompanying consolidated balance sheets because it could become redeemable due to certain change in control clauses that are outside of the Company's control. The convertible preferred stock is not redeemable, except in the event of a deemed liquidation (see Note 10, Convertible Preferred Stock). Because the occurrence of a deemed liquidation event is not currently probable, the carrying values of the convertible preferred stock are not being accreted to their redemption values. Subsequent adjustments to the carrying values of the convertible preferred stock would be made only when a deemed liquidation event becomes probable.

Research and development costs

Research and development costs are charged to expense as incurred. Research and development costs consist of costs incurred in performing research and development activities, including salaries and bonuses, stock-based compensation, employee benefits, facilities costs, third-party license fees related to technology with no alternative future use, laboratory supplies, depreciation, manufacturing expenses, preclinical expenses, consulting and other contracted services. Costs for certain research and development activities are recognized based on the terms of the individual arrangements, which may differ from the pattern of costs incurred, and are reflected in the financial statements as prepaid or accrued research and development.

Stock-based compensation

The Company's stock-based compensation program allows for grants of stock options and restricted stock awards. Grants are awarded to employees and non-employees, including directors.

The Company accounts for its stock-based compensation in accordance with ASC Topic 718, *Compensation-Stock Compensation* (‘‘ASC 718’’). ASC 718 requires all stock-based payments to employees, non-employees and directors, to be recognized as expense in the consolidated statements of operations and comprehensive loss based on their grant date fair values. The Company estimates the fair value of options granted using the Black-Scholes option pricing model (‘‘Black-Scholes’’) for stock option grants to both employees and non-employees. The fair value of the Company’s common stock is used to determine the fair value of restricted stock awards.

The Company’s stock-based compensation awards are subject to either service or performance-based vesting conditions. Compensation expense related to awards to employees, directors and non-employees with service-based vesting conditions is recognized on a straight-line basis based on the grant date fair value over the associated service period of the award, which is generally the vesting term. Compensation expense related to awards to employees with performance-based vesting conditions is recognized over the implied service period when achievement of the performance-based milestones is deemed probable. The Company uses judgement to determine whether and, if so, how many awards are deemed probable of vesting at each reporting period.

Black-Scholes requires inputs based on certain subjective assumptions, including (i) the expected stock price volatility, (ii) the expected term of the award, (iii) the risk-free interest rate and (iv) expected dividends. Due to the lack of a public market for the Company’s common stock and lack of company-specific historical and implied volatility data, the Company has based its computation of expected volatility on the historical volatility of a representative group of public companies with similar characteristics to the Company, including stage of product development and life science industry focus. The historical volatility is calculated based on a period of time commensurate with expected term assumption. The Company uses the simplified method as prescribed by the SEC Staff Accounting Bulletin No. 107, *Share-Based Payment*, to calculate the expected term for options granted to employees and non-employees whereby, the expected term equals the arithmetic average of the vesting term and the original contractual term of the options due to its lack of sufficient historical data. The risk-free interest rate is based on U.S. Treasury securities with a maturity date commensurate with the expected term of the associated award. The expected dividend yield is assumed to be zero as the Company has never paid dividends and has no current plans to pay any dividends on its common stock. The Company recognizes forfeitures as they occur.

Due to the absence of an active market for the Company’s common stock, the Company utilized methodologies in accordance with the framework of the American Institute of Certified Public Accountants Accounting and Valuation Guide, *Valuation of Privately-Held Company Equity Securities Issued as Compensation* (“AICPA Valuation Guide”), to estimate the fair value of its common stock. The estimated fair value of the common stock has been determined at each grant date based upon a variety of factors, including the illiquid nature of the common stock, arm’s-length sales of the Company’s capital stock (including convertible preferred stock), the effect of the rights and preferences of the preferred stockholders, and the prospects of a liquidity event. Among other factors are the Company’s financial position and historical financial performance, the status of technological developments within the Company’s research, the composition and ability of the current research and management team, an evaluation or benchmark of the Company’s competition, and the current business climate in the marketplace. Significant changes to the key assumptions underlying the factors used could result in different fair values of common stock at each valuation date.

Rent expense

The Company’s real estate operating lease provides for scheduled annual rent increases throughout the lease term. The Company recognizes the effects of the scheduled rent increases on a straight-line basis over the full term of the lease. Tenant improvement allowances, if any, provided by the landlord are recorded as deferred rent and amortized as reduction to rent expense over the lease term.

Income taxes

The Company recognizes deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the Company's financial statements and tax returns. Deferred tax assets and liabilities are determined based upon the differences between the financial statement carrying amounts and the tax bases of existing assets and liabilities and for loss and credit carryforwards, using enacted tax rates expected to be in effect in the year in which the differences are expected to reverse. Deferred tax assets are reduced by a valuation allowance if it is more likely than not that these assets may not be realized. The Company determines whether it is more likely than not that a tax position will be sustained upon examination. If it is not more likely than not that a position will be sustained, none of the benefit attributable to the position is recognized. The tax benefit to be recognized for any tax position that meets the more-likely-than-not recognition threshold is calculated as the largest amount that is more than 50% likely of being realized upon resolution of the contingency. The Company accounts for interest and penalties related to uncertain tax positions as part of its provision for income taxes.

Comprehensive loss

Comprehensive loss includes net loss as well as other changes in stockholders' equity that result from transactions and economic events other than those with stockholders. For the years ended December 31, 2020 and 2019, the Company's only element of other comprehensive income was unrealized gains on marketable securities.

Net loss per share

The Company follows the two-class method when computing net loss per share, as the Company has issued shares that meet the definition of participating securities. The two-class method determines net loss per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net loss per share attributable to common stockholders is computed by dividing the net loss attributable to common stockholders by the weighted average number of common shares outstanding for the period. Diluted net loss attributable to common stockholders is computed by adjusting net loss attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net loss per share attributable to common stockholders is computed by dividing the diluted net loss attributable to common stockholders by the weighted average number of common shares outstanding for the period, including potential dilutive common shares assuming the dilutive effect of common stock equivalents.

The Company's convertible preferred stock contractually entitles the holders of such shares to participate in dividends but does not contractually require the holders of such shares to participate in losses of the Company. Accordingly, in periods in which the Company reports a net loss, such losses are not allocated to such participating securities. In periods in which the Company reports a net loss attributable to common stockholders, diluted net loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders, since dilutive common shares are not assumed to have been issued if their effect is anti-dilutive. The Company reported a net loss attributable to common stockholders for the years ended December 31, 2020 and 2019.

Segment and geographic information

Operating segments are defined as components of an entity about which separate discrete information is available for evaluation by the chief operating decision maker ("CODM"), or decision-making group, in deciding how to allocate resources and in assessing performance. The CODM is the Company's Chief Executive Officer. The Company views its operations as and manages its business in one operating segment operating exclusively in the United States.

Subsequent events

The Company performs an evaluation of all subsequent events after the balance sheet date through the date of issuance of the consolidated financial statements to ensure appropriate disclosure of events both recognized in the consolidated financial statements and events which occurred subsequently but were not recognized in the consolidated financial statements.

Recently issued accounting pronouncements

The Jumpstart Our Business Startups Act of 2012 permits an emerging growth company to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies until those standards would otherwise apply to private companies. As an emerging growth company ("EGC"), the Company has elected to take advantage of this extended transition period for certain new accounting standards.

In February 2016, the FASB issued ASU No. 2016-02, *Leases* ("ASU 2016-02"). ASU 2016-02 will require lessees to recognize most leases on their balance sheet as a right-of-use asset and a lease liability. Leases will be classified as either operating or finance leases, and classification will be based on criteria similar to current lease accounting, but without explicit bright lines. For EGCs, such as the Company, ASU 2016-02, as amended, will be effective for annual reporting periods beginning after December 15, 2021 and interim periods within those fiscal years, with early adoption permitted. The Company is currently evaluating the full impact that the adoption of ASU 2016-02 is expected to have on its financial statements; however, the adoption of ASU 2016-02 will require the recognition at the adoption date of both a lease liability, based on the present value of future lease payments, and a corresponding right-to-use asset, which amounts the Company expects to be material. The future lease payment obligations as of December 31, 2020 are disclosed in Note 7, Commitments.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments—Credit Losses* (Topic 326): Measurement of Credit Losses on Financial Instruments ("ASU 2016-13"). The standard requires that credit losses be reported using an expected losses model rather than the incurred losses model that is currently used, and establishes additional disclosures related to credit risks. For available-for-sale debt securities with unrealized losses, this standard requires allowances to be recorded instead of reducing the amortized cost of the investment. The new standard will be effective for the Company on January 1, 2023. The Company is currently evaluating the potential impact that this standard may have on its consolidated financial position and results of operations.

3. Marketable securities

Marketable securities by security type consisted of the following:

(in thousands)	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
				December 31, 2020
U.S. treasury bills and notes	$ 32,221	$ 3	$ —	$32,224
U.S. agency securities	30,890	5	—	30,895
Total	$ 63,111	$ 8	$ —	$63,119

(in thousands)	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
				December 31, 2019
U.S. treasury bills and notes	$ 10,502	$ 6	$ —	$10,508
U.S. agency securities	5,285	3	—	5,288
Total	$ 15,787	$ 9	$ —	$15,796

The remaining contractual maturities of all marketable securities were less than one year as of December 31, 2020 and 2019.

4. Property and equipment, net

Property and equipment, net, consist of the following:

(in thousands)	December 31, 2020	December 31, 2019
Lab equipment	$3,937	$1,670
Leasehold improvements	259	648
Furniture and fixtures	481	118
Computer equipment	105	31
Total property and equipment	4,782	2,467
Less accumulated depreciation	(798)	(109)
Property and equipment, net	$3,984	$2,358

Depreciation expense for the years ended December 31, 2020 and 2019 was $1.3 million and $0.1 million, respectively.

5. Fair value of financial instruments

The Company's financial instruments consist of money market funds, marketable securities, the preferred stock tranche liability as well as an antidilution right liability, and success payment liability pursuant to the Harvard/ Broad License Agreement and the Broad License Agreement. The preferred stock tranche liability is considered a freestanding financial instrument that imposes an obligation on the Company to issue shares that are potentially redeemable, resulting in liability classification under ASC 480, *Distinguishing Liabilities from Equity* ("ASC 840"). The antidilution rights and success payments liabilities meet the definition of a derivative under

ASC 815. The liabilities are carried at fair value. The following tables set forth the fair value of the Company's financial instruments by level within the fair value hierarchy:

	As of December 31, 2020			
(in thousands)	Fair value	Level 1	Level 2	Level 3
Assets				
Money market funds	$ 6,724	$ 6,724	$ —	$ —
Marketable securities:				
U.S. treasury bills and notes	32,224	—	32,224	—
U.S. agency securities	30,895	—	30,895	—
Total assets	$69,843	$ 6,724	$63,119	$ —
Liabilities				
Success payment liability	$ 2,806	$ —	$ —	$ 2,806
Antidilution rights liability	6,916	—	—	6,916
Total liabilities	$ 9,722	$ —	$ —	$ 9,722

	As of December 31, 2019			
(in thousands)	Fair value	Level 1	Level 2	Level 3
Assets				
Money market funds	$ 1,675	$ 1,675	$ —	$ —
Marketable securities:				
U.S. treasury bills and notes	10,508	—	10,508	—
U.S. agency securities	5,288	—	5,288	—
Total assets	$17,471	$ 1,675	$15,796	$ —
Liabilities				
Preferred stock tranche liability	$ 9,571	$ —	$ —	$ 9,571
Success payment liability	419	—	—	419
Antidilution rights liability	2,044	—	—	2,044
Total liabilities	$12,034	$ —	$ —	$12,034

Cash Equivalents—Cash equivalents of $6.7 million and $1.7 million as of December 31, 2020 and December 31, 2019, respectively, consisted of money market funds and are classified within Level 1 of the fair value hierarchy because they are valued using quoted market prices in active markets.

Preferred Stock Tranche Liability—The preferred stock tranche liability is stated at fair value and is considered Level 3 within the fair value hierarchy because its fair value measurement is based, in part, on significant inputs not observed in the market. The tranche liability was valued using a probability-adjusted scenario-based method that considered the probability of triggering the tranche rights through achievement of certain non-scientific and scientific milestones as well as the purchase price of Series A preferred stock. Subsequent Series A Preferred closings occurred in both 2019 and 2020 and the tranche liability has been fully settled as of December 31, 2020 (refer to Note 9, Preferred Stock tranche liability).

Antidilution Rights Liability—The antidilution rights liability represents the obligation to issue additional shares of common stock to Harvard and Broad following the completion of (1) a defined aggregate level of preferred

stock financing and (2) either a sale of the Company's preferred stock, an initial public offering, or a company sale meeting a certain value threshold. The antidilution rights liability is stated at fair value and is considered Level 3 in the fair value hierarchy because its fair value measurement is based, in part, on significant inputs not observed in the market. The antidilution rights liability related to meeting a defined aggregate level of preferred stock financing was valued using a probability-weighted present value model that considered the probability of meeting the defined aggregate level of preferred stock financing, as well as the fair value of the Company's common stock. The antidilution rights liability related to the achievement of a specified valuation through either a sale of the Company's preferred stock, an initial public offering, or a company sale was valued using a Monte Carlo simulation model, which models the value of the liability based on several key variables, including probability of event occurrence, timing of event occurrence, as well as the fair value of the Company's common stock.

At issuance in 2019, the estimated fair value of the antidilution rights liability was $1.2 million, which was recorded as research and development expense. The Company remeasured the liability at fair value with the corresponding charges of $5.4 million and $1.0 million recorded to other expense for the years ended December 31, 2020 and 2019, respectively. In addition, the antidilution rights associated with the Company achieving a defined aggregate level of preferred stock financing were partially satisfied in 2019 and fully satisfied in 2020, which settlement amounts totaled $0.1 million and $0.5 million, respectively, and which amounts were settled through issuances of 121,411 and 187,867 shares of the Company's common stock, respectively. The Company will continue to adjust the remaining antidilution rights liability for changes in fair value until the obligation is satisfied in full upon completion of its initial public offering.

The primary inputs used in valuing the antidilution rights liability associated with the Company achieving a defined aggregate level of preferred stock financing upon remeasurement at December 31, 2019 and at inception in 2019, were as follows:

	At December 31, 2019	At Inception in 2019
Fair value of common stock (per share)	$ 2.59	$ 1.11
Expected amount to be raised subject to antidilution rights	28,750	46,800
Probability range of preferred stock financing amount being achieved	50%	25—50%
Expected term (in years)	0.25	1.05

The primary inputs used in valuing the antidilution rights liability associated with the Company's realization of a certain valuation threshold through either a sale of the Company's preferred stock, an initial public offering, or a company sale upon remeasurement at December 31, 2020 and 2019 and at inception in 2019 are included together with the "Success Payment Liability" table below.

Success Payment Liability—The Company is obligated to pay to Harvard and Broad tiered success payments in the event its average market capitalization exceeds specified thresholds ascending from a high nine digit dollar amount to $10.0 billion, or sale of the Company for consideration in excess of those thresholds. In the event of a change of control or a sale of the Company, the Company is required to pay in cash within a specified period following such event. Otherwise, the payments may be settled at the Company's option in either cash or shares of its common stock, or a combination of cash and shares of its common stock. The maximum aggregate success payments that could be payable by the Company is $31.3 million (after termination of the Broad agreement). At inception of the agreements, the success payment liability was recorded at fair value with the cost recorded as research and development expense and will be remeasured at each reporting period with charges recorded in other income (expense) while the instrument is outstanding.

The success payments liability is stated at fair value and is considered Level 3 because its fair value measurement is based, in part, on significant inputs not observed in the market. The Company used a Monte Carlo simulation model, which models the value of the liability based on several key variables, including probability of event occurrence, timing of event occurrence, as well as the value of the Company's common stock. The Company also estimated the likelihood that it would maintain both the Harvard/Broad License Agreement and the Broad License Agreement based on its on-going research efforts.

At issuance in 2019, the estimated fair value of the success payment liability was $0.4 million, which was recorded as research and development expense. The Company remeasured the liability at fair value with the corresponding charges of $2.4 million and less than $0.1 million recorded to other expense for the years ended December 31, 2020 and 2019, respectively. No settlements of the success payment liability occurred during 2020 and 2019. The Company will continue to adjust the success payment liability for changes in fair value until the earlier of the achievement or expiration of the obligation.

The primary inputs used in valuing (i) the success payments liability and (ii) the antidilution rights liability associated with the Company's realization of a certain valuation threshold through either a sale of the Company's preferred stock, an initial public offering, or a company sale upon remeasurement at December 31, 2020 and 2019 and at inception in 2019, were as follows:

	At December 31, 2020	At December 31, 2019	At Inception in 2019
Fair value of common stock (per share)	$ 8.24	$ 2.59	$ 1.11
Equity volatility	105%	100%	90%
Cumulative probability of triggering event	70%	11%	10%
Expected term (in years)	0.50	2.89	2.46

The fair value of the common stock was determined by management with the assistance of an independent third-party valuation specialist using methods consistent with the AICPA Valuation Guide. The computation of equity volatility was estimated using available information about the historical volatility of stocks of similar publicly traded companies for a period matching the expected term assumption. In addition, the Company incorporated the timing and probability of future events in the calculation of liabilities. The Company also estimated the likelihood that it would maintain both the Harvard/Broad License Agreement and the Broad License Agreement based on its on-going research efforts. The Company applied a 90% probability of termination of the Broad License Agreement at December 31, 2020.

In February 2021, the Company provided written notice to Broad of its election to terminate the Broad License Agreement, which termination would be effective in June 2021. See Note 17, Subsequent events.

The reconciliation of changes in the fair value of financial instruments based on Level 3 inputs for the years ended December 31, 2020 and 2019 is as follows:

(in thousands)	Preferred stock tranche liability	Antidilution rights liability	Success payment liability	Total
Balance at December 31, 2018	$ 4,604	$ —	$ —	$ 4,604
Issuance of fair value instrument	84	1,197	351	1,632
Issuance of common stock	—	(135)	—	(135)
Changes in fair value	4,883	982	68	5,933
Balance at December 31, 2019	9,571	2,044	419	12,034
Issuance of Series A Preferred	(7,064)	—	—	(7,064)
Issuance of common stock	—	(487)	—	(487)
Change in fair value	(2,507)	5,359	2,387	5,239
Balance at December 31, 2020	$ —	$ 6,916	$ 2,806	$ 9,722

6. Accrued expenses

Accrued expenses consist of the following:

	December 31,	
(in thousands)	2020	2019
Employee compensation and related benefits	$1,636	$ 624
Accrued external research and development expenses	4,827	67
License agreements	83	255
Professional fees	303	36
Other	340	129
Total	$7,189	$1,111

7. Commitments

Operating leases

In January 2019, the Company entered into an operating lease for office and laboratory space in Cambridge, Massachusetts that expired in December 2019.

In August 2019, the Company entered into an operating lease for 7,484 square feet of office and laboratory space with an end date of January 31, 2023 in Cambridge, Massachusetts. The landlord agreed to fund up to $0.1 million in tenant improvements. The Company subsequently notified the landlord in June 2020 of its desire to terminate the operating lease in August 2020 and was required to pay a termination penalty less than $0.1 million.

In April 2020, the Company signed an operating lease for 16,843 square feet of office and laboratory space in Cambridge, Massachusetts. Lease payments commenced in August 2020. The lease is subject to fixed rate escalation increases. The Company recognizes rent expense on a straight-line basis over the expected lease term, which is 2.2 years. The Company began to record rent expense in June 2020 upon gaining access to and control of the space. Deferred rent is amortized as a reduction in rent expense over the term of the lease. In addition, upon execution of the lease, the Company provided a letter of credit issued as a security deposit of

approximately $0.4 million. The Company has recorded cash held to secure this letter of credit as restricted cash in the accompanying consolidated balance sheet as of December 31, 2020.

Future minimum lease payments for the Company's facility are as follows:

Years ending December 31,	Amount (in thousands)
2021	$ 1,671
2022	992
Thereafter	—
Total future minimum lease payments	$ 2,663

Rent expense for the years ended December 31, 2020 and 2019, was $1.3 million and $0.2 million, respectively.

8. License agreements

Harvard/Broad license agreement and Broad license agreement

In March 2019, the Company simultaneously entered into the Harvard/Broad License Agreement and Broad License Agreement (the "license agreements") for certain base editing technologies pursuant to which the Company received exclusive, worldwide, sublicensable, royalty-bearing licenses under specified patent rights to develop and commercialize licensed products and nonexclusive, worldwide, sublicensable, royalty-bearing licenses under certain patent rights to research and develop licensed products. The Company agreed to use commercially reasonable efforts to develop licensed products in accordance with the development plans, to introduce any licensed products that gain regulatory approval into the commercial market, to market licensed products that have gained regulatory approval following such introduction into the market, and to make licensed products that have gained regulatory approval reasonably available to the public. The term of the agreements will continue until the expiration of the last to expire valid claim. The Company may terminate either of the license agreements without cause upon four months' prior written notice to Harvard and Broad, unless terminated earlier. In February 2021, the Company provided written notice to Broad of its intent to terminate the Broad License Agreement, which termination would be effective in June 2021. See Note 17, Subsequent events.

As partial consideration for the rights granted under the Harvard/ Broad License Agreement and Broad License Agreement, the Company paid $0.3 million in non-refundable upfront license fees and also issued 276,075 shares of its common stock with a fair value of $0.3 million. Additional consideration under the license agreements is as follows:

Antidilution Rights—The initial shares of common stock issued to Harvard and Broad are subject to antidilution provisions as further described in Note 5, Fair value of financial instruments. The antidilution rights associated with the Company achieving a defined aggregate level of preferred stock financing were partially satisfied in 2019 and fully satisfied in 2020, which settlement amounts totaled $0.1 million and $0.5 million, respectively, and which amounts were settled through issuances of 121,411 and 187,867 shares of common stock, respectively. The remaining antidilution rights liability will be satisfied upon meeting a defined value threshold, which could occur upon the closing of the Company's initial public offering.

Success Payments—The Company is required to make success payments under the license agreements as further described in Note 5, Fair value of financial instruments. As of and for the years ended December 31, 2020 and 2019, no success payments were paid or due.

Other Payments—The Company agreed to pay an annual license maintenance fee ranging from low-to-mid five figures to low six figures, depending on the particular calendar year, for each of the license agreements. The

Company is responsible for the payment of certain patent prosecution and maintenance costs incurred by Harvard and Broad related to licensed patents. To the extent achieved, the Company is obligated to pay up to an aggregate of $46.2 million and $108 million in development and sales-based milestones, respectively. If the Company undergoes a change of control during the term of the license agreements, then certain of the milestone payments would be increased by a mid-double-digit percentage. To the extent there are sales of a licensed product, the Company is required to pay low single digit royalties on net sales, for each of the license agreements. The Company is entitled to certain reductions and offsets on these royalties with respect to a licensed product in a given country.

The Company concluded that the assets acquired from Harvard and Broad did not meet the accounting definition of a business as inputs, but no processes or outputs were acquired with the licenses. As the inputs that were acquired along with the licenses do not constitute a “business,” the transaction has been accounted for as an asset acquisition. As of the date of the license agreements, the assets acquired had no alternative future use and the assets had not reached a stage of technological feasibility. As a result, all share-based and cash payment obligations have been recorded as research and development expense in the statement of operations and comprehensive loss.

At the inception of the license agreements in March 2019, the Company recognized $2.1 million as research and development expense, which includes the non-refundable upfront license fees payable in cash and the fair value of the common stock issued, along with the initial fair values of the antidilution rights liability and success payment liability. As further disclosed in Note 5, the antidilution rights liability and success payment liability are remeasured at fair value each reporting period with subsequent changes recognized in other income (expense).

Verily agreement

In March 2019, the Company and Verily Life Sciences LLC (“Verily”) entered into a collaboration agreement. Pursuant to the agreement, the Company and Verily intend to collaborate to utilize Verily’s nanoparticle platform to screen, develop and characterize improved nanoparticles for the delivery of the Company’s gene editing tools to enable development and commercialization of nanoparticle-based drug products. As part of the agreement, Verily granted the Company an exclusive, perpetual, worldwide, sublicensable, fully paid right and license to Verily’s solely owned and developed intellectual property to research, develop, make, offer for sale, sell and import products targeting the Company’s gene targets for the treatment or prevention of atherosclerotic cardiovascular disease. The term of the agreement continues until the earlier of (i) completion of all activities related to the collaboration or (ii) the three-year anniversary of the agreement date, unless terminated earlier. At any time during the term, the Company has the right to terminate the agreement in its entirety for any reason by delivering a 90-day termination notice to Verily.

As partial consideration for the license rights granted by Verily, at inception of the arrangement, the Company paid a one-time, nonrefundable fee through the issuance of 1,672,240 shares of Series A Preferred with a fair value of $0.6 million. To the extent achieved, the Company was obligated to make one-time payments to Verily of up to $5.5 million in development-based milestones. The Company paid a milestone payment of $1.0 million in 2020 related to a study in wild type mice that demonstrated a certain gene editing percentage level. In addition, as consideration for Verily’s activities under the agreement, the Company was obligated to pay a $0.3 million quarterly development payment for a period of ten quarters.

The Company concluded the assets acquired from Verily did not meet the accounting definition of a business as inputs, but no processes or outputs were acquired with the licenses. As the inputs that were acquired along with the licenses do not constitute a “business,” the transaction has been accounted for as an asset acquisition. As of the date of the collaboration agreement, the assets acquired had no alternative future use and the assets had

not reached a stage of technological feasibility. As a result, at the inception of the agreement in 2019, the Company recognized $0.6 million as research and development expense, which includes the one-time, nonrefundable license fee settled through issuing 1,672,240 shares of Series A Preferred. In addition, the Company recognized $0.8 million in quarterly development payments to Verily as research and development expense in 2019. In 2020, the Company recognized the milestone payment of $1.0 million described above as research and development expense upon achievement of the related development-based milestone. Further, the Company recognized $0.5 million in quarterly development payments to Verily as research and development expense in 2020.

The Company elected to terminate the agreement with Verily effective June 26, 2020 and has no outstanding amounts due or payable to Verily as of December 31, 2020.

Beam license agreement

In April 2019, the Company and Beam Therapeutics, Inc. (“Beam”) entered into a collaboration and license agreement. Pursuant to the agreement, the Company received an exclusive, worldwide, sublicensable license under certain of Beam’s base editing technology, gene editing, and delivery technologies to develop, make, use, offer for sale, sell and import base editing products and nuclease products using Beam’s CRISPR associated protein 12b, or Cas12b technology, in each case, directed to any of four gene targets, including the PCSK9 and ANGPTL3 genes, that are associated with an increased risk of coronary diseases. In addition, the Company granted Beam an exclusive, worldwide, sublicensable license under certain of its delivery technology to develop, manufacture, sell and import product candidates and products, except for base editor products.

Both parties may conduct certain activities in accordance with an agreed-upon research and/or development plan. Following the final dosing of a patient in a Phase 1 clinical trial of a given licensed product, Beam has the right to opt in to share 33% of worldwide expenses of the development of such licensed product, as well as jointly commercialize and share profits and expenses of commercializing such licensed product in the United States on a 50/50 basis. If Beam exercises its opt-in right for a given licensed product, which we refer to following such opt-in as a collaboration product, it will be obligated to pay for a specified percentage of the development and commercialization costs of such collaboration product and will have the right to receive a specified percentage of the profits from any sales of such collaboration product. The term of the agreement continues until the last to expire of any royalty term for any product. The Company has the right to terminate the agreement as to any licensed product, but not for any collaboration product, by delivering a 90-day termination notice to Beam, provided that Beam has elected not to exercise its opt-in right or the period to exercise such opt-in right has expired.

The Company is responsible for all costs and expenses incurred in the conduct of activities under the research plan, any development plan and any costs and expenses for the development of a licensed product for which Beam has not elected to opt-in.

As partial consideration for the license rights granted by Beam, the Company paid a one-time, nonrefundable fee through issuing 276,075 shares of its common stock with a fair value of $0.3 million. To the extent achieved, for each licensed product, the Company is also obligated to pay up to $11.3 million in development and regulatory-based milestones and $15.0 million in sales-based milestones. To the extent there are sales of a licensed product, the Company is required to pay low-to-mid single digit royalties on net sales. To the extent achieved, for each collaboration product outside of the United States, the Company is obligated to pay up to $5.6 million in development and regulatory-based milestones and $7.5 million in sales-based milestones. To the extent there are ex-U.S. sales of a collaboration product, the Company is required to pay low-to-mid single digit royalties on net sales.

The parties have also promised that in further consideration for the licenses granted under the parties' respective delivery technologies, each party will pay to the other party development-based milestone payments up to $6.0 million for each delivery technology product of such paying party to achieve the corresponding milestone event. The triggering of these milestone payments was not considered probable as of the transaction date, and no expense has been recorded for these milestones as of December 31, 2020. To the extent there are sales of a delivery technology product, each party will pay the other party low-to-mid single digit royalties based on the annual aggregate worldwide net sales resulting from the sale of each delivery technology product of such paying party; provided, however, that such royalty payments will not apply to net sales of the collaboration products or licensed products. The Company concluded the receipt of any milestone or royalty payments under the agreement was not probable as of December 31, 2020.

The Company further concluded the assets acquired from Beam did not meet the accounting definition of a business as inputs, but no processes or outputs were acquired with the licenses. As the inputs that were acquired along with the licenses do not constitute a "business," the transaction has been accounted for as an asset acquisition. As of the date of the license agreement, the assets acquired had no alternative future use and the assets had not reached a stage of technological feasibility. As a result, at the inception of the agreement in 2019, the Company recognized $0.3 million as research and development expense, which includes the one-time, nonrefundable license fee settled through the issuance of 276,075 shares of common stock.

Acuitas agreements

Development and option agreement

In December 2019, the Company and Acuitas Therapeutics, Inc. ("Acuitas") entered into a development and option agreement, which agreement was amended and restated in October 2020. Pursuant to the agreement, Acuitas granted the Company a non-exclusive, worldwide, royalty-free license under its LNP technology. The Acuitas development and option agreement provides the Company the option to enter into separate non-exclusive license agreements for a specified number of gene targets under which it can pursue further development and commercialization of licensed products that include the Acuitas LNP technology.

The Company and Acuitas will jointly conduct activities using the Acuitas LNP technologies and the Company's genome editing technology for development of licensed products. Unless sooner terminated, the development and option agreement will terminate on the third anniversary of the agreement, provided that the Company has the option to extend the term for an additional two years upon six months' prior written notice to Acuitas. The Company can terminate the development and option agreement without cause upon prior written notice to Acuitas.

As consideration for entering into the agreement and the access rights granted by Acuitas, the Company paid a one-time, nonrefundable technology access fee of $0.5 million. The Company is also obligated to pay to Acuitas an annual target reservation fee of $0.1 million. In addition, the Company will pay an annual technology maintenance fee of $0.3 million for each of the options that have not been exercised. Upon exercising the option to enter into a non-exclusive license agreement for any gene target, the Company will be required to pay Acuitas $2.0 million less any amounts from the target reservation and maintenance fees that are creditable against the option exercise fee. The option exercise fees under the agreement will be recorded as research and development expense, if and when the Company exercises such options.

In 2019, the Company recognized $0.5 million as research and development expense which includes the non-refundable upfront technology access fee and the human genome target reservation fees. In addition, the Company agreed to reimburse Acuitas on a quarterly basis for its services performed related to the program activities based on an agreed upon number of fulltime employees committed to work on the program at an

annual rate per employee, including reimbursement of reasonable external costs. These services commenced during 2020 and the Company recognized research and development expense of $2.0 million for the year ended December 31, 2020 related to the reimbursement of research and development services provided by Acuitas and technology maintenance fees. In 2020 upon the one-year anniversary of the agreement the Company had exercised one of its options to enter into a non-exclusive license agreement, as further described below.

License agreement

In October 2020, the Company exercised an option with respect to a licensed product and a licensed genome target and entered into a non-exclusive, worldwide license with Acuitas, with a right to sub-license through multiple tiers, under the licensed LNP technology to research, develop and commercialize the licensed products using the LNP technology in connection with the PCSK9 gene target for all human therapeutic or prophylactic uses. The Company has the right to terminate the license agreement without cause upon prior written notice to Acuitas. Unless earlier terminated, the license agreement will terminate on a licensed product-by-licensed product and country-by-country basis until the later of (i) the expiration of the last to expire valid claim in the licensed technology that covers the licensed product in such country, (ii) the expiration of the regulatory exclusivity period and (iii) ten years from the first commercial sale of the licensed product in such country.

In addition to an upfront, nonrefundable license fee of $2.0 million (less previously paid target reservation fees), the Company is required to pay an annual license maintenance fee of $0.8 million until the achievement of a certain development-based milestone. To the extent achieved, the Company is also obligated to pay up to an aggregate of $9.8 million in clinical and regulatory milestones and $9.5 million in sales-based milestones. The milestones have not been achieved and no expense has been recorded for these milestones as of December 31, 2020. To the extent there are sales of a licensed product, the Company is required to pay low single digit royalties on net sales.

The Company concluded that the assets acquired from Acuitas did not meet the accounting definition of a business as inputs, but no processes or outputs were acquired with the licenses. As the inputs that were acquired along with the licenses do not constitute a “business,” the transaction has been accounted for as an asset acquisition. As of the date of the license agreement, the assets acquired had no alternative future use and the assets had not reached a stage of technological feasibility. As a result, all cash payment obligations for the Acuitas license agreement have been recorded as research and development expense in the statement of operations and comprehensive loss.

At the inception of the license agreement in October 2020, the Company recognized $2.0 million as research and development expense which includes the non-refundable upfront license fees.

9. Preferred stock tranche liability

Included in the terms of the Series A purchase agreement (see Note 10) were certain tranche rights whereupon the Company is obligated to issue, and the Series A Preferred investors have the obligation to purchase, additional shares of Series A Preferred, as follows:

- 29,347,825 shares of Series A Preferred at $0.598 per share upon the Company achieving certain scientific and non-scientific milestones (“second tranche”); and
- 49,749,167 shares of Series A Preferred at $0.598 per share upon the Company achieving additional scientific and non-scientific milestones (“third tranche”).

The second tranche and third tranche represent freestanding financial instruments accounted for as liabilities under ASC 480 because these tranche rights (i) embody an obligation to repurchase the Company’s equity

shares and (ii) may require the Company to settle the obligation by transferring assets. As a result, upon issuance, the respective tranche rights were initially recorded at fair value and subsequently re-measured at fair value in each reporting period (and at settlement, as applicable). Changes in the fair value were recognized as a component of other income (expense) in the consolidated statements of operations and comprehensive loss. The second tranche and third tranche were settled in 2019 and 2020, respectively.

While outstanding, the estimated fair value of the tranche rights was determined using a probability-weighted present value model that considered the probability of triggering the tranche rights through achievement of the scientific and non-scientific milestones. The estimates were based, in part, on subjective assumptions. Changes to these assumptions could have had a significant impact on the reported fair value of the tranche rights. Significant assumptions for the third tranche as of December 31, 2019 include a 50% cumulative probability of achieving the remaining third tranche milestones and an estimated term of 0.4 years. Additional details for the second tranche and third tranche are included below.

Second tranche

During 2018, the estimated fair value of the second tranche was insignificant. In April 2019, the board of directors agreed to amend certain scientific milestones and subsequently determined the second tranche milestones, as modified, were achieved and the Company settled the second tranche by issuing 29,347,825 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $17.5 million.

Third tranche

During 2018, the estimated fair value of the third tranche approximated $4.6 million. The increase in fair value of the third preferred stock tranche liability of $4.8 million in 2019 is attributed to an increase in the cumulative probability of achieving the third tranche milestones from 2018 to 2019. In March 2020, the board of directors agreed to waive the final remaining milestones and determined the third tranche milestones, as modified, were achieved. In March 2020, the Company settled the third tranche by issuing 49,749,167 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $29.8 million.

A rollforward of the preferred stock tranche liability for the years ended December 31, 2020 and 2019 is included in Note 5, Fair value of financial instruments.

10. Convertible preferred stock

The Company has issued and sold Series A Preferred and Series A-2 Preferred, as follows:

During 2018, the Company issued and sold 19,565,217 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $11.7 million. The Company incurred issuance costs in connection with these transactions of $0.2 million. These issuances included the tranche rights for the second tranche and third tranche, as previously described in Note 9, Preferred Stock tranche liability.

In March 2019, the Company issued 1,672,240 shares of Series A Preferred in exchange for in-licensing certain technologies from Verily. See Note 8, License agreements.

In August 2019, the Company issued 29,347,825 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $17.5 million. This issuance represented the settlement of the second tranche. See Note 9, Preferred Stock tranche liability.

In October 2019, the Company issued 836,122 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $0.5 million. This issuance included tranche rights for the third tranche. See Note 9, Preferred Stock tranche liability.

In March 2020, the Company issued 49,749,167 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $29.8 million. This issuance represented the settlement of the third tranche. See Note 9, Preferred Stock tranche liability.

Between April and June 2020, the Company issued 78,348,461 shares of Series A-2 Preferred at a price of $0.8041 per share for gross proceeds of $63.0 million. The Company incurred issuance costs in connection with this transaction of $0.1 million.

Upon issuance of each of Series A Preferred and Series A-2 Preferred, the Company assessed the embedded conversion and liquidation features of the shares and determined that such features did not require the Company to separately account for these features. The Company also concluded that no beneficial conversion feature existed on the issuance date of each of Series A Preferred and Series A-2 Preferred.

As of December 31, 2020, the Series A Preferred and Series A-2 Preferred consisted of the following:

(in thousands, except for share data)	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A Preferred	101,170,571	101,170,571	$ 62,272	$ 60,500	10,926,133
Series A-2 Preferred	78,348,462	78,348,461	62,888	63,000	8,461,411
	179,519,033	179,519,032	$ 125,160	$ 123,500	19,387,544

As of December 31, 2019, there were 51,421,404 shares of Series A Preferred issued and outstanding having a carrying value and liquidation preference of $25.5 million and $30.8 million, respectively.

The following is a summary of the rights and preferences of the Series A Preferred and Series A-2 Preferred as of December 31, 2020:

Conversion—Each share of Series A Preferred and Series A-2 Preferred may be converted at any time, at the option of the holder, into shares of common stock, subject to the applicable conversion rate as determined by dividing the original issue price by the conversion price. The initial conversion price for each of the Series A Preferred and Series A-2 Preferred (each as may be adjusted for certain dilutive events) is $0.598 and $0.8041 per share, respectively. Each series of Series A Preferred and Series A-2 Preferred automatically converts into shares of common stock on a 1:1 conversion ratio (as may be adjusted for certain dilutive events) at the earlier of the closing of an initial public offering of the Company's common stock with gross proceeds to the Company of at least $50.0 million and a purchase price of $22.34 per share, or at the election of the holders of at least two-thirds of the then-outstanding shares of Preferred Stock.

Dividends—Holders are entitled to non-cumulative dividends of $0.05 per share with respect to Series A Preferred and $0.06 per share with respect to the Series A-2 Preferred, when, as, and if declared by the board of directors. No dividends have been declared through December 31, 2020.

Voting Rights—Series A Preferred, Series A-2 Preferred and common stock generally vote together as one class on an as-converted basis; however, common stock voting rights on certain matters are subject to the powers, preferences, and rights of the Series A Preferred and Series A-2 Preferred. The holders of Series A Preferred and Series A-2 Preferred, voting together as a single class, are entitled to elect three directors to the Company's board of directors and the holders of common stock, voting as a single class, are entitled to elect two directors to the Company's board of directors. Certain actions, such as mergers, consolidation, sale of substantially all assets, liquidation, dissolution, wind up of business, or any other deemed liquidation events, must be approved by the holders of at least two-thirds of the then-outstanding shares of Series A Preferred and Series A-2 Preferred.

Liquidation Preference—Upon liquidation, dissolution, or winding up of business, the holders of the Series A Preferred and Series A-2 Preferred are entitled to receive a liquidation preference in priority over the holders of common stock, at an amount per share equal to the greater of i) the original Series A Preferred and Series A-2 Preferred issue price plus any declared but unpaid dividends, or ii) the amount per share payable had all shares of Series A Preferred and Series A-2 Preferred been converted to common stock immediately prior to such liquidation. If assets available for distribution are insufficient to satisfy the liquidation payment to holders in full, assets available for distribution will be allocated among holders based on their pro rata shareholdings. When holders are satisfied in full, any excess assets available for distribution will be allocated ratably among the holders of common stock based on their pro rata holdings. Upon a deemed liquidation event, as defined, holders have the option to redeem their outstanding shares at a price equal to the liquidation payment amounts summarized above.

Redemption—Aside from upon the occurrence of a deemed liquidation event, the Series A Preferred and Series A-2 preferred are not redeemable.

11. Common stock

The Company was authorized to issue up to 255,000,000 and 164,016,724 shares of common stock with a $0.001 par value per share as of December 31, 2020 and 2019, respectively. In January 2021, the Company increased the number of shares of authorized common stock issuable to 355,000,000.

The holders of common stock are entitled to one vote for each share of common stock. Subject to the payment in full of all preferential dividends to which the holders of the Preferred Stock are entitled, the holders of common stock shall be entitled to receive dividends out of funds legally available. In the event of any voluntary or involuntary liquidation, dissolution, or winding up of the Company, after the payment or provision for payment of all debts and liabilities of the Company and all preferential amounts to which the holders of Preferred Stock are entitled with respect to the distribution of assets in liquidation, the holders of common stock shall be entitled to share ratably in the remaining assets of the Company available for distribution.

As of December 31, 2020, the Company has reserved 19,387,544 shares of common stock for the potential conversion of Preferred Stock and 3,888,823 shares of common stock for the potential exercise of outstanding stock options under the 2018 Equity Incentive Plan (the “2018 Plan”).

12. Stock-based compensation

2018 equity incentive plan

In 2018, the board of directors adopted the 2018 Plan, which provided for the grant of qualified incentive stock options, non-statutory stock options, stock appreciation rights, restricted stock and restricted stock units to the Company’s employees, officers, directors, advisors, and outside consultants for the issuance or purchase of shares of the Company’s common stock. As of December 31, 2020, the 2018 Plan allowed for the issuance of up to 5,054,615 shares of the Company’s common stock for the issuance of stock options and restricted stock, of which 1,054,335 shares remained available for future grant under the 2018 Plan.

The 2018 Plan is administered by the board of directors. The exercise prices, vesting and other restrictions are determined at the discretion of the board of directors, except that the exercise price per share of stock options may not be less than 100% of the fair market value of the common stock on the date of grant. Stock options awarded under the 2018 Plan expire 10 years after the grant date unless the board of directors sets a shorter term. Vesting periods for awards under the 2018 Plan are determined at the discretion of the board of directors. Incentive stock options granted to employees and shares of restricted stock granted to officers,

founders and consultants of the Company typically vest over four years. Certain options provide for accelerated vesting if there is a change in control, as defined in the 2018 Plan. Non-statutory options granted to employees, officers, members of the board of directors and consultants of the Company typically vest over four years.

For the years ended December 31, 2020 and December 31, 2019, the Company recorded stock-based compensation expense of $0.9 million and $0.4 million, respectively. Stock compensation expense for 2020 included less than $0.1 million related to restricted stock and $0.8 million related to stock options. Stock compensation expense for the year ended December 31, 2019 included $0.1 million related to restricted stock and $0.3 million related to stock options.

Stock-based compensation expense recorded as research and development and general and administrative expenses in the consolidated statements of operations and comprehensive loss is as follows:

	Year ended December 31,	
(in thousands)	**2020**	**2019**
Research and development	$ 494	$ 336
General and administrative	356	110
Total stock-based compensation expense	$ 850	$ 446

Stock options

The assumptions used in Black-Scholes for stock options granted were as follows:

	Year ended December 31,	
	2020	**2019**
Expected volatility	84.8%	76.1%
Weighted-average risk-free interest rate	0.4%	2.2%
Expected dividend yield	—	—
Expected term (in years)	6.0	5.9

A summary of option activity under the 2018 Plan during the year ended December 31, 2020 was as follows:

	Number of options	Weighted average exercise price per share	Weighted average remaining contractual life (in years)	Aggregate intrinsic value(2) (in thousands)
Outstanding at December 31, 2019	1,933,507	$ 1.39		
Granted	1,965,619	2.87		
Exercised	(5,849)	1.76		
Forfeited	(4,454)	1.39		
Outstanding at December 31, 2020	3,888,823	$ 2.13	9.1	$ 23,689
Exercisable at December 31, 2020	812,721	$ 1.39	8.4	$ 5,551
Expected to vest after December 31, 2020(1)	3,076,102	$ 2.31	9.3	$ 18,138

(1) This represents the number of unvested options outstanding as of December 31, 2020 that are expected to vest in the future.

(2) The aggregate intrinsic value is calculated as the difference between the exercise price of the underlying options and the estimated fair value of the common stock for the options that were in the money as of December 31, 2020.

During the year ended December 31, 2020 the weighted average grant-date fair value of the stock options granted was $2.87 per share. The aggregate intrinsic value of stock options exercised during the year ended December 31, 2020 was approximately $19,000 while the Company received $11,000 in proceeds for the exercise of these options. There were no options exercised during the year ended December 31, 2019.

As of December 31, 2020, there was $5.8 million of unrecognized compensation cost related to unvested stock options, which is expected to be recognized over a weighted-average period of approximately 3.2 years.

Restricted stock

In 2018, the Company issued 2,150,537 shares of restricted common stock at a post-split fair value of $0.0028 per share. The restricted shares vest in 48 equal monthly installments, commencing on January 1, 2018. The restricted shares vest at 537,635 shares per year and will be fully vested by December 31, 2021.

If the holders of the above restricted common stock cease to have a business relationship with the Company, the Company may reacquire any unvested shares of common stock held by these individuals for the original purchase price or fair value, whichever is lower at the time of repurchase. The amounts received to date for the purchase price of restricted stock are immaterial. The unvested shares of restricted common stock are not considered outstanding shares for accounting purposes until the shares vest.

In November 2018, the Company issued 204,813 shares of restricted stock to a consultant of the Company, with a vesting start date of May 1, 2018. The Company subsequently executed a promissory note to provide the consultant a $0.1 million loan related to the taxes associated with the restricted stock award. The consultant subsequently made two promissory note payments approximating $12,000 each during 2019. On November 14, 2019, the Company terminated its relationship with the consultant and agreed to forgive the remaining outstanding promissory note balance of $86,000 while 99,206 shares were forfeited by the consultant. The remaining shares were deemed to be vested.

The Company recognized total compensation expense of $0.2 million related to the consultant's vested shares, of which $0.1 million was recognized for the year ended December 31, 2019.

A summary of the status of and change in unvested restricted stock as of December 31, 2020 was as follows:

	Shares		Weighted-average grant date fair value per share
Unvested as of December 31, 2019	1,075,268	$	0.0028
Vested	(537,635)	$	0.0028
Unvested as of December 31, 2020	537,633	$	0.0028

At December 31, 2020, there was less than $0.1 million of unrecognized stock-based compensation expense related to restricted stock that is expected to vest. These costs are expected to be recognized over a weighted-average remaining vesting period of 1.0 year.

13. Net loss per share attributable to common stockholders

The following table summarizes the computation of basic and diluted net loss per share attributable to common stockholders of the Company:

	Year ended December 31,	
	2020	2019
	(in thousands, except share and per share amounts)	
Numerator:		
Net loss attributable to common stockholders	$ (45,704)	$ (19,297)
Denominator:		
Weighted average number of common shares, basic and diluted	2,250,093	1,277,156
Net loss per common share attributable to common stockholders, basic and diluted	$ (20.31)	$ (15.11)

The Company's potential dilutive securities, which include convertible preferred stock, unvested restricted stock and common stock options, have been excluded from the computation of diluted net loss per share as the effects would be anti-dilutive. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at period end, from the computation of diluted net loss per share attributable to common stockholders for the period indicated because including them would have had an anti-dilutive effect:

	Year ended December 31,	
	2020	2019
Convertible preferred stock	19,387,544	5,553,367
Unvested restricted stock	537,633	1,075,268
Outstanding options to purchase common stock	3,888,823	1,933,507
Total	23,814,000	8,562,142

14. Income taxes

A reconciliation of the income tax expense computed using the federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year ended December 31,	
(in thousands)	2020	2019
Federal statutory rate	21.0%	21.0%
Change in valuation allowance	(29.6%)	(17.9%)
Permanent items	0.8%	(5.9%)
State income taxes, net of federal benefit	6.8%	1.7%
Research and development tax credits	1.0%	1.1%
Total	—%	—%

The components of the Company's deferred taxes are as follows:

(in thousands)	December 31, 2020	December 31, 2019
Deferred tax assets:		
Net operating loss carryforwards	$ 12,973	$ 2,817
Capitalized costs—net of amortization	855	491
Research and development tax credits	682	205
Antidilultion liability	2,815	601
Other	210	101
Accrued expenses	905	140
Total deferred tax assets	18,440	4,355
Deferred tax liabilities:		
Property and equipment	(1,061)	(544)
Total deferred tax liabilities	(1,061)	(544)
Total deferred tax assets, net	17,379	3,811
Less: valuation allowance	(17,379)	(3,811)
Deferred tax assets, net of valuation allowance	$ —	$ —

The Company has incurred net operating losses in each year since inception. The Company had no income tax expense due to the operating loss incurred for years ended December 31, 2020 and 2019. Management has evaluated the positive and negative evidence bearing upon the realizability of the Company's net deferred tax assets and has determined that it is more likely than not that the Company will not recognize the benefits of the net deferred tax assets. As a result, the Company has recorded a full valuation allowance at December 31, 2020 and 2019. The valuation allowance increased by $13.6 million in 2020, due to the increase in deferred tax assets, primarily due to net operating loss carryforwards and increase in deferred tax assets associated with current year temporary items. The valuation allowance increased by $3.5 million in 2019, primarily due to the increase in deferred tax assets, primarily due to net operating loss carryforwards.

Realization of the future tax benefits is dependent on many factors, including the Company's ability to generate taxable income within the net operating loss carryforward period. The Company's ability to utilize these federal and state net operating loss carryforwards may be limited in the future if the Company experiences an ownership change pursuant to Internal Revenue Code 382. An ownership change occurs when the ownership percentages of 5% or greater shareholders change by more than 50% over a three-year period. As of December 31, 2020, the Company has not completed a study to assess whether a change of control has occurred and whether the net operating losses and credits are limited due to a change in ownership.

As of December 31, 2020, the Company had approximately $49.2 million of pre-tax federal and $41.6 million of pre-tax state net operating loss carryforwards. The federal net operating losses have an indefinite life and the state net operating losses will start to expire in 2038. Additionally, as of December 31, 2020, the Company had approximately $0.3 million of federal and $0.4 million of Massachusetts tax credits that expire starting in 2039 and 2034, respectively.

As of December 31, 2020 and 2019, the Company had no uncertain tax positions. The Company recognizes both interest and penalties associated with unrecognized tax benefits as a component of income tax expense. The Company has not recorded any interest or penalties for unrecognized tax benefits since its inception.

The Company files income tax returns in the United States, the Commonwealth of Massachusetts, and Pennsylvania, in all tax years since inception. In addition, the Company will file an income tax return in

Connecticut for the year ended December 31, 2020. The Company is not currently under examination by the Internal Revenue Service or any other jurisdiction for these years. All tax years remain open to tax examination. To the extent the Company has tax attribute carryforwards, the tax years in which the attribute was generated may be adjusted upon examination by the Internal Revenue Service or state tax authorities to the extent utilized in a future period. No federal or state tax audits are currently in process.

15. Related party transactions

For the years ended December 31, 2020 and 2019, the Company made total payments of $0.4 million to the five founder shareholders for scientific consulting and other expenses. These same individuals also vested in 537,635 shares of restricted stock for each of the years ended December 31, 2020 and 2019.

An executive of Beam is a board member of the Company. In 2018, Beam purchased 501,672 shares of the Series A Preferred at a price of $0.598 per share, which also included rights to the second tranche and third tranche, as further described in Note 9, Preferred Stock tranche liability. Beam subsequently purchased 752,508 and 1,254,181 shares of Series A Preferred at a price of $0.598 per share upon the settlement of the second tranche and third tranche in 2019 and 2020, respectively.

From February 2019 through December 2019, the Company leased office space from Beam in Cambridge, Massachusetts. Total rent payments under this sublease was less than $0.1 million.

In April 2019, the Company and Beam entered into a collaboration and license agreement. As partial consideration for the license rights granted by Beam, the Company paid a one-time, nonrefundable fee through issuing 276,075 shares of its common stock with a fair value of $0.3 million. Refer to Note 8, License agreements.

In July 2019, the Company agreed to be designated as Beam’s collaboration partner in an NHP study connected to Beam’s development and option agreement with Acuitas. As a result, Beam granted the Company a non-exclusive, royalty-free sublicense under Beam’s right, title and interest in and to certain Acuitas technology, solely to the extent necessary to enable the Company to perform the NHP study activities. The Company paid to Beam a one-time payment of $0.1 million upon execution of the agreement and is responsible for certain out-of-pocket costs incurred by Beam in connection with the performance of the NHP study activities. The Company incurred research and development expense of $0.0 million and $0.1 million related to these reimbursement payments to Beam for the years ended December 31, 2020 and 2019, respectively.

In October 2020, the Company and Beam entered into a materials exchange agreement wherein the parties agreed that Beam would provide certain mRNA, gRNA, and protein to the Company and that the Company would provide certain gRNAs to Beam at an agreed upon price per each material provided. For the year ended December 31, 2020, the Company recognized $0.2 million as research and development expense related to payments made for materials purchased from Beam and also recognized $0.3 million as a reduction to research and development expense related to reimbursements received for materials sold to Beam.

An officer of the Company is affiliated with Massachusetts General Hospital (“MGH”) as a physician. In February 2019 and November of 2019, the Company entered into an Option License Agreement and Patent License Agreement, respectively, with MGH. Upon execution of the agreements in 2019, the Company incurred $0.2 million for option and license issue fees, which were recorded as research and development expense. In 2020, the Company incurred $0.1 million for an annual license fee, which was recorded as research and development expense.

An executive of Broad is a board member of the Company. In March 2019, the Company simultaneously entered into the Harvard/Broad License Agreement and Broad License Agreement for certain base editing technologies pursuant to which the Company received exclusive, worldwide, sublicensable, royalty-bearing licenses under

specified patent rights to develop and commercialize licensed products and nonexclusive, worldwide, sublicensable, royalty-bearing licenses under certain patent rights to research and develop licensed products. As partial consideration for the rights granted under the license agreements, the Company paid $0.2 million in non-refundable upfront license fees and also issued 199,009 shares of its common stock to Broad with a fair value of $0.2 million. Additional consideration under the license agreements include antidilution rights and success payments. See Note 8, License agreements.

In March 2018, the Company entered into a promissory note with one of its founders. The amount of the loan, together with accrued and unpaid interest, was payable upon the closing of the Company's first equity financing of at least $5.0 million. The Company borrowed $0.1 million from the founder in April 2018. The $0.1 million was fully repaid, plus an immaterial amount of interest, by the Company in September 2018.

16. Employee benefit plans

The Company has a defined-contribution plan established under Section 401(k) of the Internal Revenue Code (the "401(k) Plan"), which covers substantially all employees. Employees are eligible to participate in the 401(k) Plan beginning on the first day of the month following commencement of their employment. The 401(k) Plan includes a salary deferral arrangement pursuant to which participants may elect to reduce their current compensation by up to the statutorily prescribed limit, equal to $19,500 in 2020, and have the amount of the reduction contributed to the 401(k) Plan. As of January 1, 2020 the Company matches 100% of each participant's annual contribution to the 401(k) plan up to 3% of the participant's salary and then 50% of each participant's contribution up to 2% of the participant's salary. The match immediately vests 100%. The matching contributions by the Company to the 401(k) plan were $0.1 million for the year ended December 31, 2020.

17. Subsequent events

The Company evaluated all subsequent events through April 16, 2021 the date that these consolidated financial statements were issued, except for Note 17(E), as to which the date is June 14, 2021, to determine if such events should be reflected in these consolidated financial statements.

(A) Convertible preferred stock (unaudited)

On January 14, 2021, the Company issued 77,163,022 shares of Series B Preferred at a price of $1.22 per share, resulting in gross cash proceeds of $94.0 million. The terms of the Series B Preferred are substantially the same as the terms of the Series A and Series A-2 Preferred, except for the liquidation preference per share, which is equal to the per share price paid, as well as the annual dividend rate per share, which is $0.10. In connection with the issuance, the Company increased the number of authorized shares of preferred stock from 179,519,033 shares to 256,682,054 shares and increased the number of authorized shares of common stock from 255,000,000 to 355,000,000.

(B) 2018 Plan (unaudited)

In January 2021, the Company increased the number of shares of common stock authorized for issuance under the 2018 Plan from 5,054,615 shares to 6,885,653 shares.

(C) Lease amendment (unaudited)

In January 2021, the Company amended its current lease for office and laboratory space in Cambridge by expanding the lease for an additional 2,980 square feet, which included aggregate lease payments of $0.4 million.

(D) Termination of the Broad license agreement (unaudited)

In February 2021, the Company provided written notice to Broad of its intent to terminate the Broad License Agreement, in which termination would be effective in June 2021.

(E) Reverse stock split

On June 11, 2021, the Company effected a one-for-9.2595 reverse stock split of the Company's issued and outstanding common stock and eliminated the minimum price per share of common stock for an underwritten public offering that would result in the automatic conversion of the outstanding existing convertible preferred stock. Accordingly, all shares of common stock and per share amounts, as well as the conversion ratio of the Company's outstanding convertible preferred stock, for all periods presented in the accompanying consolidated financial statements and notes thereto have been retroactively adjusted, where applicable, to reflect the reverse stock split, including reclassification of par and additional paid-in capital amounts as a result of the reverse stock split.

(F) Other (unaudited)

On June 3, 2021, the board of directors adopted the 2021 Stock Incentive Plan, or the 2021 Plan, which will become effective immediately prior to the effectiveness of the Company's registration statement and will serve as the successor to the 2018 Plan. The 2021 Plan authorizes the award of incentive stock options, nonstatutory stock options, restricted stock awards, stock appreciation rights, and restricted stock units. Under the 2021 Plan, 3,466,530 shares of common stock, plus any reserved shares not issued or subject to outstanding grants under the 2018 Plan on the effective date of the 2021 Plan and shares of common stock subject to awards granted under the 2018 Plan which expire, terminate or are otherwise surrendered, forfeited or repurchased by the Company, are reserved for issuance pursuant to awards granted under the 2021 Plan. The number of shares reserved for issuance under the 2021 Plan will increase automatically on the first day of each fiscal year commencing on January 1, 2022 through January 1, 2031 by the number of shares equal to the lesser of 5% of the aggregate number of outstanding shares of common stock on such date, or a number as may be determined by the board of directors.

On June 3, 2021, the board of directors adopted the 2021 Employee Stock Purchase Plan, or the ESPP, which will become effective immediately prior to the effectiveness of the Company's registration statement. The Company amended and restated the ESPP on June 10, 2021. The Company has initially reserved 433,316 shares of common stock for sale under the ESPP. The aggregate number of shares reserved for sale under the ESPP will increase automatically on the first day of each fiscal year commencing on January 1, 2022 through January 1, 2031, by the number of shares equal to the least of (a) 1,083,290 shares, (b) 1% of the total outstanding shares of common stock on such date, and (c) a number of shares as may be determined by the board of directors in any particular year.

Verve Therapeutics, Inc.
Condensed consolidated balance sheets

(unaudited) (in thousands, except share and per share amounts)	March 31, 2021	December 31, 2020
Assets		
Current assets:		
Cash and cash equivalents	$ 99,397	$ 8,993
Marketable securities	50,126	63,119
Prepaid expenses and other current assets	2,318	1,854
Total current assets	151,841	73,966
Property and equipment, net	5,202	3,984
Restricted cash	463	463
Other long term assets	663	—
Total assets	$ 158,169	$ 78,413
Liabilities, convertible preferred stock, and stockholders' deficit		
Current liabilities:		
Accounts payable	$ 2,487	$ 36
Accrued expenses	4,061	7,189
Deferred rent, current portion	136	90
Total current liabilities	6,684	7,315
Deferred rent, net of current portion	53	125
Success payment liability (See Note 8 and Note 15)	2,424	2,806
Antidilution rights liability (See Note 8 and Note 15)	6,520	6,916
Total liabilities	15,681	17,162
Commitments and contingencies (See Note 7 and Note 8)		
Convertible preferred stock (See Note 10)	218,919	125,160
Stockholders' deficit:		
Common stock, $0.001 par value; 355,000,000 and 255,000,000 shares authorized, 3,172,168 and 3,123,424 shares issued at March 31, 2021 and December 31, 2020, respectively; 2,768,943 and 2,585,789 shares outstanding at March 31, 2021 and December 31, 2020, respectively	3	3
Additional paid-in capital	3,358	2,616
Accumulated other comprehensive income	7	8
Accumulated deficit	(79,799)	(66,536)
Total stockholders' deficit	(76,431)	(63,909)
Total liabilities, convertible preferred stock, and stockholders' deficit	$ 158,169	$ 78,413

The accompanying notes are an integral part of these condensed consolidated financial statements.

Verve Therapeutics, Inc.
Condensed consolidated statements of operations and comprehensive loss

(in thousands, except share and per share amounts) (unaudited)	Three months ended March 31, 2021	2020
Operating expenses:		
Research and development	$ 11,345	$ 6,523
General and administrative	2,716	846
Total operating expenses	14,061	7,369
Loss from operations	(14,061)	(7,369)
Other income (expense):		
Change in fair value of preferred stock tranche liability	—	2,507
Change in fair value of antidilution rights liability	396	(882)
Change in fair value of success payment liability	382	64
Interest income and other income (expense), net	20	77
Total other (expense) income, net	798	1,766
Net loss	$ (13,263)	$ (5,603)
Net loss per common share attributable to common stockholders, basic and diluted	$ (4.99)	$ (2.92)
Weighted-average common shares used in net loss per share attributable to common stockholders, basic and diluted	2,656,278	1,917,486
Comprehensive Loss:		
Net loss	$ (13,263)	$ (5,603)
Other comprehensive (loss) income:		
Unrealized (loss) gain on marketable securities	(1)	11
Comprehensive loss	$ (13,264)	$ (5,592)

The accompanying notes are an integral part of these condensed consolidated financial statements.

Verve Therapeutics, Inc.
Condensed consolidated statements of convertible preferred stock and stockholders' deficit

(in thousands, except share amounts) (unaudited)	Convertible preferred stock		Common stock		Additional paid-in capital	Accumulated other comprehensive income (loss)	Accumulated deficit	Total stockholders' deficit
	Shares	Amount	Shares	Amount				
Balance at December 31, 2019	51,421,404	$ 25,480	1,854,438	$ 2	$ 1,268	$ 9	$ (20,832)	$ (19,553)
Issuance of Series A convertible preferred stock, net of issuance costs of $22	49,749,167	36,792	—	—	—	—	—	—
Issuance of common stock to licensor institutions	—	—	187,867	—	487	—	—	487
Vesting of restricted common stock	—	—	134,409	—	—	—	—	—
Exercise of stock options	—	—	2,025	—	3	—	—	3
Unrealized gain on available-for-sale securities	—	—	—	—	—	11	—	11
Stock-based compensation	—	—	—	—	95	—	—	95
Net loss	—	—	—	—	—	—	(5,603)	(5,603)
Balance at March 31, 2020	101,170,571	$ 62,272	2,178,739	$ 2	$ 1,853	$ 20	$ (26,435)	$ (24,560)
Balance at December 31, 2020	179,519,032	$125,160	2,585,789	$ 3	$ 2,616	$ 8	$ (66,536)	$ (63,909)
Issuance of Series B convertible preferred stock, net of issuance costs of $241	77,163,022	93,759	—	—	—	—	—	—
Vesting of restricted common stock	—	—	134,409	—	—	—	—	—
Exercise of stock options	—	—	48,745	—	72	—	—	72
Unrealized loss on available-for-sale securities	—	—	—	—	—	(1)	—	(1)
Stock-based compensation	—	—	—	—	670	—	—	670
Net loss	—	—	—	—	—	—	(13,263)	(13,263)
Balance at March 31, 2021	256,682,054	$218,919	2,768,943	$ 3	$ 3,358	$ 7	$ (79,799)	$ (76,431)

The accompanying notes are an integral part of these condensed consolidated financial statements.

Verve Therapeutics, Inc.
Condensed consolidated statements of cash flows

(unaudited, in thousands)	Three months ended March 31, 2021	2020
Cash flows from operating activities:		
Net loss	$ (13,263)	$ (5,603)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	294	165
Amortization of premium on marketable securities	208	6
Stock-based compensation	670	95
Change in fair value of preferred stock tranche liabilities	—	(2,507)
Change in fair value of antidilution rights	(396)	882
Change in fair value of success payments liabilities	(382)	(64)
Changes in operating assets and liabilities:		
Prepaid expenses and other assets	(1,128)	(144)
Accounts payable	1,928	(104)
Accrued expenses and other liabilities	(3,047)	458
Deferred rent liability	(25)	(6)
Net cash used in operating activities	(15,141)	(6,822)
Cash flows from investing activities:		
Purchases of property and equipment	(1,070)	(1,053)
Purchases of marketable securities	(11,176)	—
Maturities of marketable securities	23,960	9,692
Net cash provided by investing activities	11,714	8,639
Cash flows from financing activities		
Proceeds from issuance of Series A Preferred Stock, net	—	29,728
Proceeds from issuance of Series B Preferred Stock, net	93,759	—
Proceeds from exercise of stock options	72	3
Net cash provided by financing activities	93,831	29,731
Increase in cash, cash equivalents and restricted cash	90,404	31,548
Cash, cash equivalents and restricted cash—beginning of period	9,456	3,221
Cash, cash equivalents and restricted cash—end of period	$ 99,860	$ 34,769
Supplemental disclosure of noncash investing activities:		
Property and equipment additions included in accounts payable and accrued expenses	$ 528	$ 24
Supplemental disclosures of noncash financing activities:		
Settlement of tranche right liability	$ —	$ 7,064
Partial settlement of derivative liability by issuing common stock	$ —	$ 487

The accompanying notes are an integral part of these condensed consolidated financial statements.

Verve Therapeutics, Inc.
Notes to condensed consolidated financial statements (unaudited)

1. Nature of the business and basis of presentation

Organization

Verve Therapeutics, Inc. (the “Company” or “Verve”) is a genetic medicines company pioneering a new approach to the care of cardiovascular disease, transforming treatment from chronic management to single-course gene editing medicines. The Company was incorporated on March 9, 2018 as Endcadia, Inc., a Delaware corporation, and began operations shortly thereafter. In January 2019, the Company amended its certificate of incorporation to change its name to Verve Therapeutics, Inc. The Company’s principal offices are located in Cambridge, Massachusetts.

Since its inception, the Company has devoted its efforts principally to research and development and raising capital. The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry including, but not limited to, technical risks associated with the successful research, development and manufacturing of product candidates, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations and the ability to secure additional capital to fund operations. Current and future programs will require significant research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if the Company’s development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

Basis of presentation and liquidity

The accompanying condensed consolidated financial statements have been prepared in accordance with United States generally accepted accounting principles (“GAAP”) and pursuant to the rules and regulations of the Securities and Exchange Commission. Any reference in these notes to applicable guidance is meant to refer to the authoritative GAAP as found in the Accounting Standards Codification (“ASC”) and Accounting Standards Update (“ASU”) of the Financial Accounting Standards Board (“FASB”). Certain information and footnote disclosures normally included in financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to such rules and regulations.

The unaudited interim condensed consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements. In the opinion of the Company’s management, the accompanying unaudited interim condensed consolidated financial statements contain all adjustments that are necessary to present fairly the Company’s financial position as of March 31, 2021, the results of its operations and other comprehensive loss for the three months ended March 31, 2021 and 2020, convertible preferred stock and stockholders’ deficit for the three months ended March 31, 2021 and 2020 and cash flows for the three months ended March 31, 2021 and 2020. Such adjustments are of a normal and recurring nature. The results for the three months ended March 31, 2021 are not necessarily indicative of the results for the year ending December 31, 2021, or for any future period. These interim financial statements should be read in conjunction with the audited consolidated financial statements as of and for the year ended December 31, 2020, and the notes thereto, which are included elsewhere in this prospectus.

The accompanying condensed consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities and commitments in the ordinary

course of business. The Company has incurred losses since its inception, including losses of $13.3 million and $5.6 million for the three months ended March 31, 2021 and 2020, respectively. As of March 31, 2021, the Company had an accumulated deficit of $79.8 million. To date, the Company has funded its operations primarily with proceeds from the sale of preferred stock. The Company expects to generate operating losses and negative operating cash flows for the foreseeable future.

The Company expects that its cash, cash equivalents and marketable securities of $149.5 million as of March 31, 2021 will be sufficient to fund its operations for at least the next twelve months from the date of issuance of these financial statements. The Company will need additional financing to support its continuing operations and pursue its growth strategy. Until such time as the Company can generate significant revenue from product sales, if ever, it expects to finance its operations through a combination of equity offerings, debt financings, collaborations, strategic alliances and licensing arrangements. The Company may be unable to raise additional funds or enter into such other agreements when needed on favorable terms or at all. The inability to raise capital as and when needed could have a negative impact on the Company's financial condition and its ability to pursue its business strategy. The Company will need to generate significant revenue to achieve profitability, and it may never do so.

The Company is seeking to complete an initial public offering ("IPO") of its common stock. Upon the completion of a qualified public offering on specified terms, the Company's outstanding convertible preferred stock will automatically convert into shares of common stock (see Note 11, Common Stock).

2. Summary of significant accounting policies

The Company's significant accounting policies are disclosed in Note 2, "Summary of significant accounting policies," in the audited consolidated financial statements for the year ended December 31, 2020 included elsewhere in this prospectus. Since the date of those financial statements, there have been no changes to its significant accounting policies.

Restricted cash

Restricted cash represents collateral provided for a letter of credit issued as a security deposit in connection with the Company's lease of its corporate facilities. A reconciliation of the cash, cash equivalents, and restricted cash reported within the balance sheet that sum to the total of the same amounts shown in the statement of cash flows is as follows:

(in thousands)	March 31, 2021	March 31, 2020
Cash and cash equivalents	$ 99,397	$ 34,534
Restricted cash	463	235
Total cash, cash equivalents and restricted cash	$ 99,860	$ 34,769

Deferred offering costs

The Company capitalizes certain legal, professional, accounting and other third-party fees that are directly associated with in-process equity issuances as deferred offering costs until such equity issuances are consummated. After consummation of the equity issuance, these costs are recorded as a reduction in the capitalized amount associated with the equity issuance. As of March 31, 2021, the Company had $0.7 million in deferred offering costs, which were included in other long term assets on the accompanying balance sheet.

3. Marketable securities

Marketable securities by security type consisted of the following:

	March 31, 2021			
(in thousands)	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
U.S. treasury bills and notes	$ 33,297	$ 6	$ (1)	$33,302
U.S. agency securities	16,822	2	—	16,824
Total	$ 50,119	$ 8	$ (1)	$50,126

	December 31, 2020			
(in thousands)	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
U.S. treasury bills and notes	$ 32,221	$ 3	$ —	$32,224
U.S. agency securities	30,890	5	—	30,895
Total	$ 63,111	$ 8	$ —	$63,119

The remaining contractual maturities of all marketable securities were less than one year as of March 31, 2021 and December 31, 2020.

4. Property and equipment, net

Property and equipment, net, consist of the following:

(in thousands)	March 31, 2021	December 31, 2020
Lab equipment	$ 5,340	$ 3,937
Leasehold improvements	325	259
Furniture and fixtures	507	481
Computer equipment	122	105
Total property and equipment	6,294	4,782
Less accumulated depreciation	(1,092)	(798)
Property and equipment, net	$ 5,202	$ 3,984

Depreciation expense for the three months ended March 31, 2021 and 2020 was $0.3 million and $0.2 million, respectively.

5. Fair value of financial instruments

The Company's financial instruments that are measured at fair value on a recurring basis consist of money market funds, marketable securities, the preferred stock tranche liability as well as certain derivative liabilities (antidilution right liability and success payment liability) pursuant to the Harvard/Broad License Agreement and the Broad License Agreement.

The following tables set forth the fair value of the Company's financial instruments by level within the fair value hierarchy:

	As of March 31, 2021			
(in thousands)	Fair value	Level 1	Level 2	Level 3
Assets				
Money market funds	$19,650	$19,650	$ —	$ —
Marketable securities:				
U.S. treasury bills and notes	33,302	—	33,302	—
U.S. agency securities	16,824	—	16,824	—
Total assets	$69,776	$19,650	$50,126	$ —
Liabilities				
Success payment liability	$ 2,424	$ —	$ —	$ 2,424
Antidilution rights liability	6,520	—	—	6,520
Total liabilities	$ 8,944	$ —	$ —	$ 8,944

	As of December 31, 2020			
(in thousands)	Fair value	Level 1	Level 2	Level 3
Assets				
Money market funds	$ 6,724	$ 6,724	$ —	$ —
Marketable securities:				
U.S. treasury bills and notes	32,224	—	32,224	—
U.S. agency securities	30,895	—	30,895	—
Total assets	$69,843	$ 6,724	$63,119	$ —
Liabilities				
Success payment liability	$ 2,806	$ —	$ —	$ 2,806
Antidilution rights liability	6,916	—	—	6,916
Total liabilities	$ 9,722	$ —	$ —	$ 9,722

Cash Equivalents—Cash equivalents of $19.7 million and $6.7 million as of March 31, 2021 and December 31, 2020, respectively, consisted of money market funds and are classified within Level 1 of the fair value hierarchy because they are valued using quoted market prices in active markets.

Marketable Securities—The Company measures its marketable securities at fair value on a recurring basis and classifies those instruments within Level 2 of the fair value hierarchy. Marketable securities are classified within Level 2 of the fair value hierarchy because pricing inputs are other than quoted prices in active markets, which are either directly or indirectly observable as of the reporting date, and fair value is determined through the use of models or other valuation methodologies.

Preferred Stock Tranche Liability—The preferred stock tranche is considered Level 3 within the fair value hierarchy because its fair value measurement is based, in part, on significant inputs not observed in the market. The preferred stock tranche liability was valued using a probability-adjusted scenario-based method that considered the probability of triggering the tranche rights through achievement of certain non-scientific and scientific milestones as well as the purchase price of Series A preferred stock. Subsequent Series A Preferred

closings occurred in both 2019 and 2020 and the tranche liability was fully settled during the three months ended March 31, 2020.

Antidilution Rights Liability—The antidilution rights liability represents the obligation to issue additional shares of common stock to Harvard and Broad following the completion of (1) a defined aggregate level of preferred stock financing and (2) either a sale of the Company's preferred stock, an initial public offering, or a company sale meeting a certain value threshold. The antidilution rights liability is stated at fair value and is considered Level 3 in the fair value hierarchy because its fair value measurement is based, in part, on significant inputs not observed in the market. The antidilution rights liability related to meeting a defined aggregate level of preferred stock financing was valued using a probability-weighted present value model that considered the probability of meeting the defined aggregate level of preferred stock financing, as well as the fair value of the Company's common stock. The antidilution rights liability related to the achievement of a specified valuation through either a sale of the Company's preferred stock, an initial public offering, or a company sale was valued using a Monte Carlo simulation model, which models the value of the liability based on several key variables, including probability of event occurrence, timing of event occurrence, as well as the fair value of the Company's common stock.

The Company remeasured the liability at fair value with a corresponding increase of $0.4 million to other income for the three months ended March 31, 2021 and an increase of $0.9 million to other expense for three months ended March 31, 2020. In addition, the antidilution rights associated with the Company achieving a defined aggregate level of preferred stock financing were fully satisfied in the three months ended March 31, 2020, which were settled through the issuance of 187,867 shares of the Company's common stock for a settlement amount of $0.5 million.

The Company will continue to adjust the remaining antidilution rights liability for changes in fair value until the obligation is satisfied in full, which is expected to occur upon completion of its initial public offering. The primary inputs used in valuing the antidilution rights liability associated with the Company's realization of a certain valuation threshold at March 31, 2021 and December 31, 2020 are included together with the "Success Payment Liability" table below.

Success Payment Liability—The Company is obligated to pay to Harvard and Broad tiered success payments in the event its average market capitalization exceeds specified thresholds ascending from a high nine-digit dollar amount to $10.0 billion, or sale of the Company for consideration in excess of those thresholds. In the event of a change of control or a sale of the Company, the Company is required to pay in cash within a specified period following such event. Otherwise, the payments may be settled at the Company's option in either cash or shares of its common stock, or a combination of cash and shares of its common stock. The maximum aggregate success payments that could be payable by the Company is $31.3 million (after termination of the Broad agreement).

The success payments liability is stated at fair value and is considered Level 3 because its fair value measurement is based, in part, on significant inputs not observed in the market. The Company used a Monte Carlo simulation model, which models the value of the liability based on several key variables, including probability of event occurrence, timing of event occurrence, as well as the value of the Company's common stock. The Company also estimated the likelihood that it would maintain both the Harvard/Broad License Agreement and the Broad License Agreement based on its on-going research efforts.

The Company remeasured the liability at fair value with corresponding increases of $0.4 million and $0.1 million recorded to other income for the three months ended March 31, 2021 and 2020, respectively. No settlements of the success payment liability occurred during the three months ended March 31, 2021 and 2020. The Company will continue to adjust the success payment liability for changes in fair value until the earlier of the achievement or expiration of the obligation.

The primary inputs used in valuing (i) the success payments liability and (ii) the antidilution rights liability associated with the Company's realization of a certain valuation threshold through either a sale of the Company's preferred stock, an initial public offering, or a company sale at March 31, 2021 and December 31, 2020, were as follows:

	At March 31, 2021	At December 31, 2020
Fair value of common stock (per share)	$ 8.98	$ 8.24
Equity volatility	105%	105%
Cumulative probability of triggering event	75%	70%
Expected term (in years)	0.23	0.50

The fair value of the common stock was determined by management with the assistance of an independent third-party valuation specialist using methods consistent with the AICPA Valuation Guide. The computation of equity volatility was estimated using available information about the historical volatility of stocks of similar publicly traded companies for a period matching the expected term assumption. In addition, the Company incorporated the timing and probability of future events in the calculation of liabilities. The Company also estimated the likelihood that it would maintain both the Harvard/Broad License Agreement and the Broad License Agreement based on its on-going research efforts. The Company applied a 90% probability of termination of the Broad License Agreement at December 31, 2020.

In February 2021, the Company provided written notice to Broad of its election to terminate the Broad License Agreement, which termination would be effective in June 2021. As a result, the Company applied a 100% probability of termination for the Broad License Agreement at March 31, 2021, which resulted in a decrease in the fair value of the antidilution and success payment liabilities as of March 31, 2021.

The reconciliation of changes in the fair value of financial instruments based on Level 3 inputs for the three months ended March 31, 2021 is as follows:

(in thousands)	Antidilution rights liability	Success payment liability	Total
Balance at December 31, 2020	$ 6,916	$ 2,806	$9,722
Changes in fair value	(396)	(382)	(778)
Balance at March 31, 2021	$ 6,520	$ 2,424	$8,944

The reconciliation of changes in the fair value of financial instruments based on Level 3 inputs for the three months ended March 31, 2020 is as follows:

(in thousands)	Preferred stock tranche liability	Antidilution rights liability	Success payment liability	Total
Balance at December 31, 2019	$ 9,571	$ 2,044	$ 419	$12,034
Issuance of Series A Preferred	(7,064)	—	—	(7,064)
Issuance of common stock	—	(487)	—	(487)
Changes in fair value	(2,507)	882	(64)	(1,689)
Balance at March 31, 2020	$ —	$ 2,439	$ 355	$ 2,794

6. Accrued expenses

Accrued expenses consist of the following:

(in thousands)	March 31, 2021	December 31, 2020
Employee compensation and related benefits	$ 640	$ 1,636
Accrued external research and development expenses	2,687	4,827
Professional fees	619	303
Other	115	423
Total	$ 4,061	$ 7,189

7. Commitments

Operating leases

In April 2020, the Company signed an operating lease for 16,843 square feet of office and laboratory space in Cambridge, Massachusetts. Lease payments commenced in August 2020. The lease is subject to fixed rate escalation increases. The Company recognizes rent expense on a straight-line basis over the expected lease term, which is 2.2 years. The Company began to record rent expense in June 2020 upon gaining access to and control of the space. Deferred rent is amortized as a reduction in rent expense over the term of the lease. In addition, upon execution of the lease, the Company provided a letter of credit issued as a security deposit of approximately $0.4 million. The Company has recorded cash held to secure this letter of credit as restricted cash in the accompanying consolidated balance sheet as of March 31, 2021.

In January 2021, the Company amended its current lease for office and laboratory space in Cambridge by expanding the lease for an additional 2,980 square feet, which included aggregate lease payments of $0.4 million.

Future minimum lease payments as of March 31, 2021 for the Company's facility are as follows:

(in thousands)	Amount
Years ending December 31,	
2021	$1,481
2022	1,167
Thereafter	—
Total future minimum lease payments	$2,648

Rent expense for the three months ended March 31, 2021 and 2020 was $0.4 million and $0.2 million, respectively.

8. License agreements

Prior to 2021, the Company entered into license agreements with various academic and health care institutions to in-license certain technologies for the Company's use. The Company's license agreements are disclosed in Note 8, "License agreements," in the audited consolidated financial statements for the year ended December 31, 2020 in this prospectus. The Company recorded $0.2 million and $2.0 million as research and development expense in the three months ended March 31, 2021 and 2020, respectively, related to these agreements.

Since the date of the audited consolidated financial statements for the year ended December 31, 2020, there have been no changes to these license agreements, except as noted below.

Harvard/Broad license agreement and Broad license agreement

In February 2021, the Company provided written notice to Broad of its intent to terminate the Broad License Agreement, in which termination would be effective in June 2021. There are no amounts due from the Company to Broad as a result of the termination.

Verily agreement

The Company elected to terminate the agreement with Verily effective June 26, 2020 and has no outstanding amounts due or payable to Verily as of March 31, 2021. The Company did not record any amounts as research and development expense in the three months ended March 31, 2021 related to this agreement and recorded $1.3 million as research and development expense in the three months ended March 31, 2020 related to this agreement.

9. Preferred stock tranche liability

Included in the terms of the Series A purchase agreement (see Note 10) were certain tranche rights whereupon the Company is obligated to issue, and the Series A Preferred investors have the obligation to purchase 49,749,167 shares of Series A Preferred at $0.598 per share upon the Company achieving additional scientific and non-scientific milestones (“third tranche”).

In March 2020, the board of directors agreed to waive the final remaining milestones and determined the third tranche milestones, as modified, were achieved. In March 2020, the Company settled the third tranche by issuing 49,749,167 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $29.8 million.

10. Convertible preferred stock

During the three months ended March 31, 2021 and 2020, the Company has issued and sold shares of its convertible preferred stock, as follows:

In January 2021, the Company issued 77,163,022 shares of Series B Preferred at a price of $1.22 per share for gross proceeds of $94.0 million. The Company incurred issuance costs in connection with this transaction of $0.2 million. In connection with the issuance, the Company increased the number of authorized shares of preferred stock from 179,519,033 shares to 256,682,054 shares and increased the number of authorized shares of common stock from 255,000,000 to 355,000,000.

In March 2020, the Company issued 49,749,167 shares of Series A Preferred at a price of $0.598 per share for gross proceeds of $29.8 million. This issuance represented the settlement of the third tranche, as described in Note 9, Preferred Stock tranche liability.

Upon issuance of the Series A, Series A-2 and Series B Preferred, the Company assessed the embedded conversion and liquidation features of the shares and determined that such features did not require the Company to separately account for these features. The Company also concluded that no beneficial conversion feature existed on the issuance date of each of Series A, Series A-2 and Series B Preferred.

The following is a summary of the rights and preferences of the Series A Preferred, Series A-2 Preferred and Series B Preferred as of March 31, 2021:

Conversion—Each share of Series A Preferred, Series A-2 Preferred and Series B Preferred may be converted at any time, at the option of the holder, into shares of common stock, subject to the applicable conversion rate as determined by dividing the original issue price by the conversion price. The initial conversion price for each of the Series A Preferred, Series A-2 Preferred and Series B Preferred (each as may be adjusted for certain dilutive events) is $0.598, $0.8041 and $1.2182 per share, respectively. Each share of Series A Preferred, Series A-2 Preferred and Series B Preferred automatically converts into shares of common stock on a 1:1 conversion ratio (as may be adjusted for certain dilutive events) at the earlier of the closing of an initial public offering of the Company's common stock with gross proceeds to the Company of at least $50.0 million and a purchase price of $22.34 per share, or at the election of the holders of at least two-thirds of the then-outstanding shares of Preferred Stock.

Dividends—Holders are entitled to non-cumulative dividends of $0.05 per share with respect to Series A Preferred, $0.06 per share with respect to Series A-2 Preferred and $0.10 per share with respect to Series B Preferred when, as, and if declared by the board of directors. No dividends have been declared through March 31, 2021.

Voting Rights—Series A Preferred, Series A-2 Preferred, Series B Preferred, and common stock generally vote together as one class on an as-converted basis; however, common stock voting rights on certain matters are subject to the powers, preferences, and rights of the Series A Preferred, Series A-2 Preferred and Series B Preferred. The holders of Series A Preferred, Series A-2 Preferred and Series B Preferred voting together as a single class, are entitled to elect three directors to the Company's board of directors and the holders of common stock, voting as a single class, are entitled to elect two directors to the Company's board of directors. Certain actions, such as mergers, consolidation, sale of substantially all assets, liquidation, dissolution, wind up of business, or any other deemed liquidation events, must be approved by the holders of at least two-thirds of the then-outstanding shares of Series A Preferred, Series A-2 Preferred and Series B Preferred.

Liquidation Preference—Upon liquidation, dissolution, or winding up of business, the holders of the Series A Preferred, Series A-2 Preferred and Series B Preferred are entitled to receive a liquidation preference in priority over the holders of common stock, at an amount per share equal to the greater of i) the original Series A Preferred, Series A-2 Preferred and Series B Preferred issue price plus any declared but unpaid dividends, or ii) the amount per share payable had all shares of Series A Preferred, Series A-2 Preferred and Series B Preferred been converted to common stock immediately prior to such liquidation. If assets available for distribution are insufficient to satisfy the liquidation payment to holders in full, assets available for distribution will be allocated among holders based on their pro rata shareholdings. When holders are satisfied in full, any excess assets available for distribution will be allocated ratably among the holders of common stock based on their pro rata holdings. Upon a deemed liquidation event, as defined, holders have the option to redeem their outstanding shares at a price equal to the liquidation payment amounts summarized above.

Redemption—Aside from the occurrence of a deemed liquidation event, the Series A Preferred, Series A-2 Preferred and Series B Preferred are not redeemable.

As of March 31, 2021, the Company's convertible preferred stock consisted of the following:

(in thousands, except for share data)	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A Preferred	101,170,571	101,170,571	$ 62,272	$ 60,500	10,926,133
Series A-2 Preferred	78,348,461	78,348,461	$ 62,888	$ 63,000	8,461,411
Series B Preferred	77,163,022	77,163,022	$ 93,759	$ 94,000	8,333,379
	256,682,054	256,682,054	$ 218,919	$ 217,500	27,720,923

As of December 31, 2020, there were 179,519,032 shares of Series A Preferred issued and outstanding having a carrying value and liquidation preference of $125.2 million and $123.5 million, respectively.

11. Common stock

The Company was authorized to issue up to 355,000,000 and 255,000,000 shares of common stock with a $0.001 par value per share as of March 31, 2021 and December 31, 2020, respectively.

The holders of common stock are entitled to one vote for each share of common stock. Subject to the payment in full of all preferential dividends to which the holders of the Preferred Stock are entitled, the holders of common stock shall be entitled to receive dividends out of funds legally available. In the event of any voluntary or involuntary liquidation, dissolution, or winding up of the Company, after the payment or provision for payment of all debts and liabilities of the Company and all preferential amounts to which the holders of Preferred Stock are entitled with respect to the distribution of assets in liquidation, the holders of common stock shall be entitled to share ratably in the remaining assets of the Company available for distribution.

As of March 31, 2021, the Company has reserved 27,720,923 shares of common stock for the potential conversion of Preferred Stock and 5,188,558 shares of common stock for the potential exercise of outstanding stock options under the 2018 Equity Incentive Plan (the "2018 Plan").

12. Stock-based compensation

2018 equity incentive plan

In 2018, the board of directors adopted the 2018 Plan, which provided for the grant of qualified incentive stock options, non-statutory stock options, stock appreciation rights, restricted stock and restricted stock units to the Company's employees, officers, directors, advisors, and outside consultants for the issuance or purchase of shares of the Company's common stock. As of March 31, 2021, the 2018 Plan allowed for the issuance of up to 6,885,653 shares of the Company's common stock for the issuance of stock options and restricted stock, of which 1,536,893 shares remained available for future grant under the 2018 Plan.

The 2018 Plan is administered by the board of directors. The exercise prices, vesting and other restrictions are determined at the discretion of the board of directors, except that the exercise price per share of stock options may not be less than 100% of the fair market value of the common stock on the date of grant. Stock options awarded under the 2018 Plan expire 10 years after the grant date unless the board of directors sets a shorter term. Vesting periods for awards under the 2018 Plan are determined at the discretion of the board of directors. Incentive stock options granted to employees and shares of restricted stock granted to officers, founders and consultants of the Company typically vest over four years. Certain options provide for accelerated vesting if there is a change in control, as defined in the 2018 Plan. Non-statutory options granted to employees, officers, members of the board of directors and consultants of the Company typically vest over four years.

Stock-based compensation expense recorded as research and development and general and administrative expenses in the consolidated statements of operations and comprehensive loss is as follows:

	Three months ended March 31,	
(in thousands)	**2021**	**2020**
Research and development	$ 313	$ 61
General and administrative	357	34
Total stock-based compensation expense	$ 670	$ 95

Stock options

There were no stock options granted during the three months ended March 31, 2020. The assumptions used in Black-Scholes for stock options granted during the three months ended March 31, 2021 were as follows:

	Three months ended March 31, 2021
Expected volatility	86.4%
Weighted-average risk-free interest rate	0.7%
Expected dividend yield	—
Expected term (in years)	6.1

A summary of option activity under the 2018 Plan during the three months ended March 31, 2021 was as follows:

	Number of options	Weighted average exercise price per share	Weighted average remaining contractual life (in years)	Aggregate intrinsic value[2] (in thousands)
Outstanding at December 31, 2020	3,888,823	$ 2.13		
Granted	1,378,854	8.24		
Exercised	(48,745)	1.48		
Forfeited	(30,374)	2.31		
Outstanding at March 31, 2021	5,188,558	$ 3.80	9.1	$ 27,021
Exercisable at March 31, 2021	910,697	$ 1.48	8.2	$ 6,863
Expected to vest after March 31, 2021[1]	4,277,861	$ 4.26	9.3	$ 20,158

(1) This represents the number of unvested options outstanding as of March 31, 2021 that are expected to vest in the future.

(2) The aggregate intrinsic value is calculated as the difference between the exercise price of the underlying options and the estimated fair value of the common stock for the options that were in the money as of March 31, 2021.

As of March 31, 2021, there was $13.2 million of unrecognized compensation cost related to unvested stock options, which is expected to be recognized over a weighted-average period of approximately 3.3 years.

Restricted stock

A summary of the status of and change in unvested restricted stock as of March 31, 2021 was as follows:

	Shares	Weighted-average grant date fair value per share
Unvested as of December 31, 2020	537,633	$ 0.0028
Vested	(134,409)	$ 0.0028
Unvested as of March 31, 2021	403,224	$ 0.0028

At March 31, 2021, there was less than $0.1 million of unrecognized stock-based compensation expense related to restricted stock that is expected to vest. These costs are expected to be recognized over a weighted-average remaining vesting period of less than 1.0 year.

13. Net loss per share attributable to common stockholders

The following table summarizes the computation of basic and diluted net loss per share attributable to common stockholders of the Company:

	Three months ended March 31,	
(in thousands, except share and per share amounts)	**2021**	**2020**
Numerator:		
Net loss attributable to common stockholders	$ (13,263)	$ (5,603)
Denominator:		
Weighted average number of common shares, basic and diluted	2,656,278	1,917,486
Net loss per common share attributable to common stockholders, basic and diluted	$ (4.99)	$ (2.92)

The Company's potential dilutive securities, which include convertible preferred stock, unvested restricted stock and common stock options, have been excluded from the computation of diluted net loss per share as the effects would be anti-dilutive. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at period end, from the computation of diluted net loss per share attributable to common stockholders for the period indicated because including them would have had an anti-dilutive effect:

	Three months ended March 31,	
	2021	**2020**
Convertible preferred stock	27,720,923	10,926,133
Unvested restricted stock	403,224	940,860
Outstanding options to purchase common stock	5,188,558	1,927,163
Total	33,312,705	13,794,156

14. Income taxes

Deferred tax assets and deferred tax liabilities are recognized based on temporary differences between the financial reporting and tax basis of assets and liabilities using statutory rates. A valuation allowance is recorded against deferred tax assets if it is more likely than not that some or all of the deferred tax assets will not be realized. Due to the uncertainty surrounding the realization of the favorable tax attributes in future tax returns, the Company has recorded a full valuation allowance against the Company's otherwise recognizable net deferred tax assets.

15. Related party transactions

For the three months ended March 31, 2021 and 2020, the Company made payments of $0.1 million and $0.1 million, respectively, to four of the founder shareholders for scientific consulting and other expenses. All five founders also vested in a total of 134,409 shares of restricted stock for each of the three months ended March 31, 2021 and 2020.

An executive of Beam is a board member of the Company. In October 2020, the Company and Beam entered into a materials exchange agreement wherein the parties agreed that Beam would provide certain mRNA, gRNA, and protein to the Company and that the Company would provide certain gRNAs to Beam at an agreed upon price per each material provided. For the three months ended March 31, 2021, the Company recognized $0.2 million as a reduction to research and development expense related to reimbursements received for materials sold to Beam. See Note 8, License agreements, to the audited consolidated financial statements for the year ended December 31, 2020.

An officer of the Company is affiliated with Massachusetts General Hospital ("MGH") as a physician. In February 2019 and November of 2019, the Company entered into an Option License Agreement and Patent License Agreement, respectively, with MGH. As part of the agreement, the Company recognizes an annual license fee of $0.1 million.

An executive of Broad is a board member of the Company. The board member resigned, effective May 2021. In March 2019, the Company simultaneously entered into the Harvard/Broad License Agreement and Broad License Agreement for certain base editing technologies pursuant to which the Company received exclusive, worldwide, sublicensable, royalty-bearing licenses under specified patent rights to develop and commercialize licensed products and nonexclusive, worldwide, sublicensable, royalty-bearing licenses under certain patent rights to research and develop licensed products. Additional consideration under the license agreements include antidilution rights and success payments. See Note 8, License agreements, to the audited consolidated financial statements for the year ended December 31, 2020.

16. Subsequent events

The Company has evaluated all subsequent events through May 28, 2021, the date these financial statements were issued, except for Note 16(A), as to which the date is June 14, 2021, to determine if such events should be reflected in these consolidated financial statements.

(A) Reverse Stock Split

On June 11, 2021, the Company effected a one-for-9.2595 reverse stock split of the Company's issued and outstanding common stock and eliminated the minimum price per share of common stock for an underwritten public offering that would result in the automatic conversion of the outstanding existing convertible preferred stock. Accordingly, all shares of common stock and per share amounts, as well as the conversion ratio of the

Company's outstanding convertible preferred stock, for all periods presented in the accompanying consolidated financial statements and notes thereto have been retroactively adjusted, where applicable, to reflect the reverse stock split, including reclassification of par and additional paid-in capital amounts as a result of the reverse stock split.

(B) Other

On June 3, 2021, the board of directors adopted the 2021 Stock Incentive Plan, or the 2021 Plan, which will become effective immediately prior to the effectiveness of the Company's registration statement and will serve as the successor to the 2018 Plan. The 2021 Plan authorizes the award of incentive stock options, nonstatutory stock options, restricted stock awards, stock appreciation rights, and restricted stock units. Under the 2021 Plan, 3,466,530 shares of common stock, plus any reserved shares not issued or subject to outstanding grants under the 2018 Plan on the effective date of the 2021 Plan and shares of common stock subject to awards granted under the 2018 Plan which expire, terminate or are otherwise surrendered, forfeited or repurchased by the Company, are reserved for issuance pursuant to awards granted under the 2021 Plan. The number of shares reserved for issuance under the 2021 Plan will increase automatically on the first day of each fiscal year commencing on January 1, 2022 through January 1, 2031 by the number of shares equal to the lesser of 5% of the aggregate number of outstanding shares of common stock on such date, or a number as may be determined by the board of directors.

On June 3, 2021, the board of directors adopted the 2021 Employee Stock Purchase Plan, or the ESPP, which will become effective immediately prior to the effectiveness of the Company's registration statement. The Company amended and restated the ESPP on June 10, 2021. The Company has initially reserved 433,316 shares of common stock for sale under the ESPP. The aggregate number of shares reserved for sale under the ESPP will increase automatically on the first day of each fiscal year commencing on January 1, 2022 through January 1, 2031, by the number of shares equal to the least of (a) 1,083,290 shares, (b) 1% of the total outstanding shares of common stock on such date, and (c) a number of shares as may be determined by the board of directors in any particular year.

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14,035,789 shares

Verve Therapeutics, Inc.

Common stock

Joint Book-Running Managers

J.P. Morgan Jefferies Guggenheim Securities William Blair

June 16, 2021

Through and including July 11, 2021 (the 25th day after the date of this prospectus), all dealers effecting transactions in the Common Stock, whether or not participating in this offering, may be required to deliver a prospectus. This delivery requirement 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.