UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2020

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934 FOR THE TRANSITION PERIOD FROM TO**

Commission File Number: 001-39979

VOR BIOPHARMA INC.

(Exact name of registrant as specified in its charter)

Delaware	**81-1591163**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
100 Cambridgepark Drive, Suite 400 Cambridge, Massachusetts	**02140**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (617) 655-6580

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.0001 par value per share	VOR	Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☐ No ☒

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒	Smaller reporting company	☒
		Emerging growth company	☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of June 30, 2020, the last day of the registrant's most recently completed second fiscal quarter, there was no public market for the registrant's common stock, $0.0001 par value per share ("Common Stock"). The registrant's Common Stock began trading on the Nasdaq Global Select Market on February 5, 2021. As of March 12, 2021, the aggregate market value of the Common Stock held by non-affiliates of the registrant was approximately $517,549,577, based on the closing price of the registrant's Common Stock on March 12, 2021. This calculation does not reflect a determination that certain persons are affiliates of the registrant for any other purpose.

The number of shares of registrant's Common Stock outstanding as of March 12, 2021 was 37,127,865.

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Note Regarding Company References

Throughout this Annual Report on Form 10-K ("Annual Report"), the "Company," "Vor," "Vor Biopharma Inc.," "we," "us," and "our," except where the context requires otherwise, refer to Vor Biopharma Inc. and its consolidated subsidiary, and "our board of directors" refers to the board of directors of Vor Biopharma Inc.

Special Note Regarding Forward-Looking Statements and Industry Data

This Annual Report contains forward-looking statements that involve substantial risks and uncertainties. All statements, other than statements of historical facts, contained in this Annual Report, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans, and objectives of management, are forward-looking statements. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "expect," "plan," "anticipate," "could," "intend," "target," "project," "estimate," "believe," "estimate," "predict," "potential" or "continue" or the negative of these terms or other similar expressions intended to identify statements about the future. These statements speak only as of the date of this Annual Report and involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our business, financial condition and results of operations. These forward-looking statements include, without limitation, statements about:

- the timing, progress and results of our preclinical studies and clinical trials of our product candidates, including statements regarding the timing of initiation and completion of studies or trials and related preparatory work, the period during which the results of the trials will become available and our research and development programs;
- the timing of clinical trials and timing of expected clinical results for our current and future product candidates;
- the timing of any submission of filings for regulatory approval of, and our ability to obtain and maintain regulatory approvals for our product candidates for any indication;
- the outbreak of the novel strain of coronavirus disease, COVID-19, which could adversely impact our business, including our preclinical studies and clinical trials;
- our ability to identify patients with the diseases treated by our product candidates, and to enroll patients in trials;
- our expectations regarding the market acceptance and opportunity for and clinical utility of our product candidates, if approved for commercial use;
- our expectations regarding the scope of any approved indication for any product candidate;
- our ability to successfully commercialize our product candidates;
- our estimates of our expenses, ongoing losses, future revenue, capital requirements and our need for or ability to obtain additional funding before we can expect to generate any revenue from product sales;
- our ability to establish or maintain collaborations or strategic relationships;
- our ability to identify, recruit and retain key personnel;
- our reliance upon intellectual property licensed from third parties and our ability to obtain such licenses on commercially reasonable terms or at all;
- our ability to protect and enforce our intellectual property position for our product candidates, and the scope of such protection;

- our financial performance;
- the period over which we estimate our existing cash and cash equivalents will be sufficient to fund our future operating expenses and capital expenditure requirements;
- our competitive position and the development of and projections relating to our competitors or our industry;
- our estimates regarding future revenue, expenses and needs for additional financing;
- the impact of laws and regulations; and
- our expectations regarding the time during which we will be an emerging growth company under the Jumpstart Our Business Startups Act of 2012.

You should read this Annual Report and the documents that we have filed as exhibits to this Annual Report 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 Annual Report are made as of the date of this Annual Report, 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. We have included important factors in this Annual Report, particularly in the "Summary Risk Factors" and “Risk Factors” sections, that could cause actual results or events to differ materially from the forward-looking statements that we make.

This Annual Report includes statistical and other industry and market data, which we obtained from our own internal estimates and research, as well as from industry and general publications and research, surveys, and studies conducted by third parties. Industry publications, studies, and surveys generally state that they have been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. While we believe that each of these studies and publications is reliable, we have not independently verified market and industry data from third-party sources. While we believe our internal company research is reliable and the market definitions are appropriate, neither such research nor these definitions have been verified by any independent source.

Summary Risk Factors

Our business is subject to a number of risks that if realized could materially affect our business, financial condition, results of operations, cash flows and access to liquidity. These risks are discussed more fully in the “Risk Factors” section of this Annual Report. Our principal risks include the following:

- We have incurred significant net losses since inception. We expect to incur net losses for the foreseeable future and may never achieve or maintain profitability.
- We will need substantial additional funding. If we are unable to raise capital when needed, we would be forced to delay, reduce or eliminate our research and product development programs or future commercialization efforts.
- We have a limited operating history, have not yet completed any clinical trials and have no history of commercializing products, which may make it difficult to evaluate the success of our business to date and to assess our future viability.
- eHSCs are a novel technology that is not yet clinically validated for human use. The approaches we are taking to create eHSCs are unproven and may never lead to marketable products.
- We are substantially dependent on the success of our two most advanced product candidates, VOR33 and VCAR33. If we are unable to complete development of, obtain approval for and commercialize VOR33 or VCAR33 in a timely manner, our business will be harmed.
- We may not be successful in our efforts to identify, develop or commercialize additional product candidates. If these efforts are unsuccessful, we may never become a commercial stage company or generate any revenues.

- We have not successfully tested our product candidates in clinical trials and any favorable preclinical results are not predictive of results that may be observed in clinical trials.
- Development of a product candidate such as VOR33, which is intended for use in combination or in sequence with an already approved therapy, will present increased complexity and more or different challenges than development of a product candidate for use as a single agent.
- If VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any of the other 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 their commercial potential or result in significant negative consequences following any potential marketing approval.
- We face significant competition in an environment of rapid technological change, and there is a possibility that our competitors may achieve regulatory approval before us or develop therapies that are safer or more advanced or effective than ours, which may harm our financial condition and our ability to successfully market or commercialize VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop.
- Adverse public perception of genetic medicines, and of genome engineering in particular, may negatively impact regulatory approval of, and/or demand for, our potential products.
- Gene engineering technology is subject to a number of challenges and risks. Because genome engineering technology is novel and the regulatory landscape that will govern VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any future product candidates we may develop is uncertain and may change, we cannot predict the time and cost of obtaining regulatory approval, if we receive it at all, for our product candidates.
- Because we are developing product candidates using new technologies, as well as potential mechanisms of action for which there are few precedents, 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.
- We contract with third parties for the manufacture and supply of materials for development of our product candidates and advancement of our current clinical trial, as well as our research programs and preclinical studies, and we expect to continue to do so for future clinical trials and for commercialization of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop. This reliance on third parties increases the risk that we will not have sufficient quantities of such materials, product candidates or any products that we may develop and commercialize, or that such supply will not be available to us at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts.
- We are highly dependent on intellectual property licensed from third parties and termination of any of these licenses could result in the loss of significant rights, which would harm our business.
- We may not be successful in acquiring or in-licensing necessary rights to key technologies underlying VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any future product candidates we may develop.
- Third-party claims of intellectual property infringement, misappropriation or other violations may prevent or delay our product discovery and development efforts and have a material adverse effect on our business.
- The COVID-19 pandemic has caused, and could continue to cause, severe disruptions in the United States, regional and global economies and could seriously harm our development efforts, increase our costs and expenses and have a material adverse effect on our business, financial condition and results of operations.

PART I

Item 1. Business.

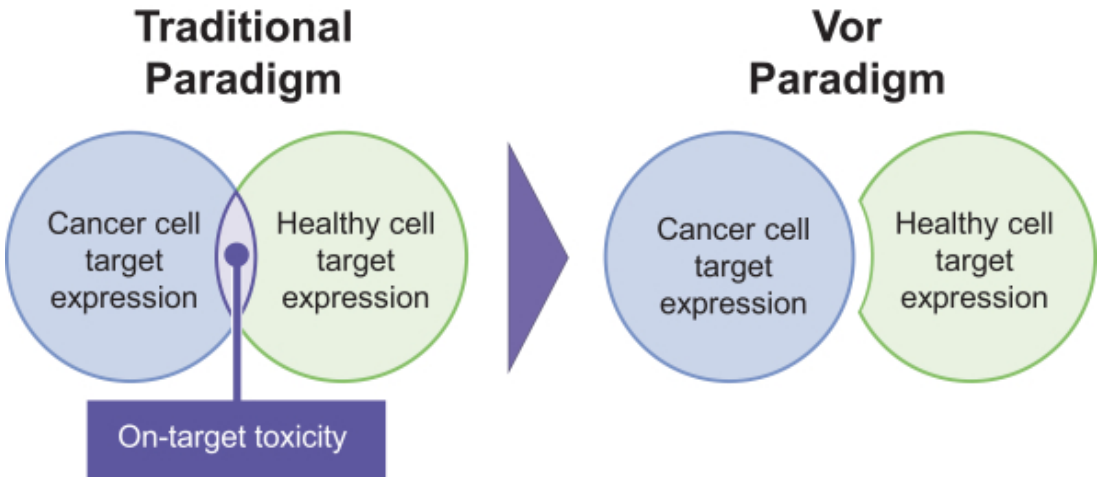
Overview

The mission of Vor Biopharma is to develop transformative treatments for patients suffering from hematological malignancies. We seek to accomplish our mission through our unique approach of engineering patients to better fight their cancer by unlocking the potential of targeted therapies with curative intent.

We are a cell therapy company combining a novel patient engineering approach with targeted therapies to provide a single company solution for patients suffering from hematological malignancies. For many patients, the only way to achieve durable remission or a cure is through hematopoietic stem cell transplant ("HSCT"). Despite undergoing HSCT, approximately 40% of acute myeloid leukemia ("AML") patients relapse and face an extremely poor prognosis, with two-year survival rates of less than 20%.

The traditional tumor target paradigm aims to treat hematological malignancies such as AML by focusing on the specificity and potency of therapies that kill cancer cells expressing a target. However, the utility of this paradigm is limited by the expression of tumor targets on healthy cells, resulting in on-target toxicity. On-target toxicity has led to the development failure of many targeted therapies and is often a key mechanism limiting therapeutic use or dose. Our proprietary platform aims to change the traditional target tumor paradigm by genetically engineering the patient to remove therapeutic targets from healthy cells.

Changing the traditional tumor target paradigm



Leveraging our expertise in hematopoietic stem cell ("HSC") biology and genome engineering, we genetically modify HSCs to remove surface targets expressed by cancer cells and then provide these cells as stem cell transplants to patients. Once these cells engraft into bone marrow, we will have engineered the patient such that their HSCs and their blood cell progeny are designed to be treatment resistant to targeted therapies, which we believe will unlock the potential of these targeted therapies to selectively destroy cancerous cells while sparing healthy cells. As a result, our engineered HSCs ("eHSCs") are designed to limit the on-target toxicities associated with these targeted therapies, which we refer to as companion therapeutics, thereby enhancing their utility and broadening their applicability.

We are developing our lead eHSC product candidate, VOR33, and our companion therapeutic, VCAR33, which together, we believe, have the potential to transform the treatment paradigm for AML and other hematological malignancies. CD33 is a clinically-validated target for AML, and we use genome engineering technology to remove CD33 surface targets from HSCs to create VOR33. In preclinical studies, we have observed

that the removal of CD33 provided robust protection of these healthy donor HSCs from the cytotoxic effects of CD33-directed companion therapeutics yet had no deleterious effects on the differentiation or function of hematopoietic cells. We intend to develop VOR33 as an HSCT product candidate to replace the standard of care in transplant settings. Once the VOR33 cells have engrafted, we believe that patients can be treated with anti-CD33 therapies, such as Mylotarg or VCAR33, with limited on-target toxicity. We believe that the combination of VOR33 and CD33-directed therapies, such as VCAR33, could lead to durable antitumor activity and potential cures. Our Investigational New Drug ("IND") application for VOR33 in patients with AML was accepted by the U.S. Food and Drug Administration ("FDA") in January 2021, and we intend to initiate our first-in-human Phase 1/2a trial of VOR33 in combination with Mylotarg, an FDA-approved CD33-directed therapy owned by Pfizer, by enrolling the first patient in the second quarter of 2021. We expect initial data from this trial to be reported in late 2021 or in the first half of 2022. The key clinical readouts of this trial, which will be the first clinical trial of our eHSCs, are engraftment of VOR33 and hematologic protection from the known myelosuppressive effects of Mylotarg. If successful, this trial will provide important validating evidence of the potential of VOR33 and our broader eHSC approach, which we believe has significant potential to improve clinical outcomes for hematological malignancies beyond AML and change the standard of care.

VCAR33 is a chimeric antigen receptor ("CAR")-T therapy designed to target CD33, a clinically-validated target for AML. We licensed VCAR33 from the National Institutes of Health (NIH) and we intend to initially develop VCAR33 as a bridge-to-transplant monotherapy for relapsed/refractory AML, where patients have failed prior lines of therapy and need further treatment to achieve morphologic remission and, if possible, subsequent HSCT. This setting typically sources T cells from the patient (autologous cells) and is the setting in which the National Marrow Donor Program ("NMDP") is currently evaluating a T cell therapy using the same CAR construct as VCAR33 in a multi-site Phase 1/2 clinical trial in young adult and pediatric patients with relapsed/refractory AML, with initial monotherapy proof-of-concept data expected in 2022, depending on the investigator's timing of data release. We expect to either assume sponsorship and oversight of the NMDP trial prior to its completion or enter into an agreement with the NMDP providing us with the right to cross-reference the trial results in future IND applications that we may submit to the FDA. In the event we cross-reference these trial results in an IND application for VCAR33, we will be required to demonstrate that VCAR33 is comparable to the T cell therapy studied in the NMDP trial, which will require us to show that our manufacturing processes and construct release specifications are sufficiently comparable to those employed in the NMDP trial. In determining comparability, we expect the FDA to evaluate whether and to what extent any changes in our process and specifications are likely to have an adverse effect on the quality, safety and efficacy of VCAR33 in comparison to the T cell therapy studied in the NMPD trial. We believe the T cell therapy being evaluated in this trial is comparable to VCAR33 and that this trial, if successful, will support future clinical development of VCAR33. Therefore, unless the context requires otherwise, we refer to this program, collectively, as VCAR33. However, the FDA may reject our claim of comparability and the sufficiency of the data to support it, or disagree with our ability to reference the preclinical, manufacturing or clinical data generated by the NMDP trial, and as a result, we may be required to repeat certain development steps undertaken in the NMDP trial if VCAR33 is considered not comparable to its construct.

We believe VOR33 and VCAR33 could be highly synergistic as a treatment system, potentially enabling prolonged remissions or cures in the post-transplant setting, which we refer to as the VOR33/VCAR33 Treatment System. We intend to investigate the VOR33/VCAR33 Treatment System, entailing VOR33 eHSC therapy followed by VCAR33 as a companion therapeutic, initially for transplant-eligible patients suffering from AML. We believe VCAR33 could be a potent anticancer therapy that, when combined with VOR33, could help obviate severe on-target myeloablative toxicities and unlock the efficacy potential of VCAR33. In addition, in this setting VCAR33 T cells could be sourced from the same cell source as VOR33 (allogeneic cells), which may provide benefits such as a healthier, more abundant cell source alongside lower risk of host T cells attacking CAR-T cells, thereby potentially prolonging persistence. To our knowledge, the FDA has not previously approved a combination cell therapy. We expect to submit an IND for the VOR33/VCAR33 Treatment System in the second half of 2022, following data from our first-in-human trial evaluating VOR33 and the NMDP-sponsored Phase 1/2 clinical trial studying VCAR33.

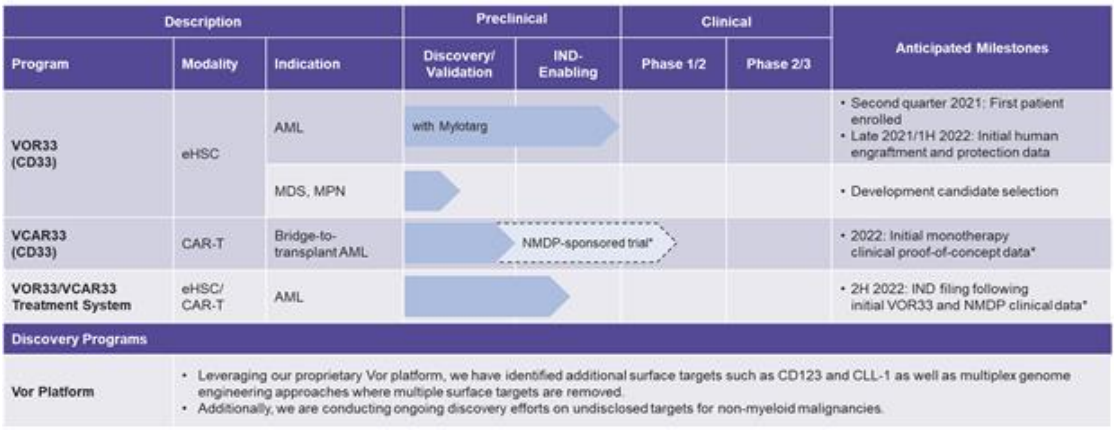
Our proprietary eHSC technology is designed to confer advantages and address several limitations associated with existing cell therapy processes. Our manufacturing of eHSCs is a fast and elegant process that leads to a rapid vein-to-vein time. We believe our rapid vein-to-vein time of seven to ten days can lead to highly differentiated

patient clinical outcomes. Additionally, with our lead eHSC product candidate VOR33, we have observed in preclinical studies a high degree of genome engineering precision with highly reproducible results across six independent healthy donors.

We believe our proprietary technology has broad applicability beyond CD33. Leveraging our platform, we are rapidly advancing the creation and preclinical testing of multiplex-engineered eHSCs, in which multiple surface targets such as CD33, CD123 and CLL-1 are removed. We intend to pair future eHSC product candidates with in-house companion therapeutics such as VCAR33, as well as with potentially best-in-class targeted therapies from collaborators, in order to bring potentially transformative outcomes to patients and establish new standard of care treatment systems for hematological malignancies.

Our Pipeline

Our initial pipeline of eHSC and CAR-T programs is shown below:



AML: acute myeloid leukemia; MDS: myelodysplastic syndrome; MPN: myeloproliferative neoplasm

**The VCAR33 construct is being studied in a Phase 1/2 clinical trial sponsored by the NMDP, and timing of data release is dependent on the investigators conducting the trial.*

Our Strategy

Our mission is to develop transformative treatments for patients suffering from hematological malignancies. We seek to accomplish our mission through our unique approach of engineering patients to better fight their cancer by unlocking the potential of targeted therapies with curative intent. We believe that the combination of our eHSCs and companion therapeutics can transform the treatment paradigm for hematological malignancies. Our strategy to accomplish this mission is as follows:

- ***Establish eHSCs as the standard of care for patients undergoing HSC transplants, thereby unlocking the potential of companion therapeutics against a broad range of hematological malignancies.*** HSCT has been the standard of care for the treatment of hematologic malignancies for decades, as it is often the only treatment pathway to durable remission and potential cure. However, approximately 40% of patients with AML will relapse after HSCT and will require additional anticancer treatments, including targeted therapies, which are limited by their on-target toxicity. To unlock the potential of those treatments, we are creating the next generation of HSCs by genetically modifying donor HSCs to render them treatment resistant to companion therapeutics, thereby protecting the patient from the cytotoxic effects of those

therapies. We are seeking to establish the use of our eHSCs as the new standard of care for patients in transplant settings suffering from hematological malignancies and improve patient outcomes.

- ***Advance our wholly owned lead eHSC program, VOR33, through clinical development in patients with AML and other hematological malignancies.*** VOR33 consists of genetically modified donor HSCs that have the CD33 surface target removed. In preclinical studies, we observed that the removal of CD33 provided robust protection of healthy donor HSCs from the cytotoxic effects of CD33-directed companion therapies yet had no deleterious effects on the differentiation or function of hematopoietic cells. We intend to develop VOR33 as an eHSC product candidate to replace the standard of care in transplant settings. Once the VOR33 cells have engrafted, we believe that patients better tolerate anti-CD33 therapies with limited on-target toxicity. We expect to initiate a Phase 1/2a clinical trial of VOR33 in AML patients who are eligible for HSCT and who are at high risk of subsequent relapse by enrolling the first patient in the second quarter of 2021. We believe the results of this trial, if successful, will validate our approach and help demonstrate the potential of our platform.
- ***Advance VCAR33, our wholly owned CAR-T therapy, as our first companion therapeutic to VOR33 and also as a bridge-to-transplant monotherapy.*** Our eHSCs have the potential to expand the use and therapeutic value of target-specific companion therapeutics. In addition to our ongoing program with Mylotarg, we intend to develop VOR33 in combination with VCAR33, an anti-CD33 CAR-T therapy we licensed from the NIH, to create the VOR33/VCAR33 Treatment System. VCAR33 is currently in a Phase 1/2 clinical trial in young adult and pediatric AML patients as a monotherapy in the bridge-to-transplant setting. Initial results from this trial are expected in 2022, and following results from this trial and our anticipated VOR33 Phase 1/2a trial, if each is successful, we intend to initiate a clinical trial studying the VOR33/VCAR33 Treatment System.
- ***Leverage our proprietary Vor platform to discover and validate targets for additional eHSCs beyond VOR33 and advance these programs into clinical development.*** We have applied the expertise gained in generating and developing VOR33 to rapidly advance the creation and preclinical testing of multiplex genome engineering, in which we remove multiple surface targets, such as CD33, CD123 and CLL-1, from HSCs. We believe that multiplex eHSCs have the potential to unlock companion therapeutics treating multiple hematologic malignancies. In addition, we are actively researching targets outside of myeloid malignancies, potentially broadening the applicability of our platform to other hematological cancers.
- ***Maximize the commercial value of our programs by leveraging the established transplant infrastructure and reimbursement framework.*** Each year, there are approximately 12,000 allogeneic HSCTs performed globally. The United States, EU5 (France, Germany, Italy, Spain and the United Kingdom) and Japan collectively have approximately 700 transplant centers, and transplant volumes are concentrated, with approximately 30 U.S. transplant centers performing 50% of U.S. transplants. We believe we can leverage this concentrated transplant infrastructure to efficiently commercialize our eHSCs, such as VOR33, if approved. Furthermore, we believe we have multiple reimbursement pathways in the United States, including new changes to Medicare that remove the burden of HSC costs from transplant centers, which we believe will open the doors toward innovative sources of stem cell transplants.
- ***Further establish our leadership in cell therapy know-how and manufacturing processes.*** HSCs are unique cell types that require specialized genome engineering know-how, as well as specific handling and manipulation processes. We have built considerable expertise manipulating the genes of these cells and have also designed a highly efficient manufacturing process for VOR33 of approximately three days, enabling a vein-to-vein time of seven to ten days. We plan to invest in our know-how and manufacturing processes, including developing internal GMP manufacturing capabilities, with the goal of further establishing ourselves as the leader in developing and producing therapeutics based on eHSCs.

Background on HSCT and the Limitations of Targeted Therapies

The standard of care for patients suffering from hematological malignancies, such as AML, is treatment with chemotherapy, targeted therapies or a combination of these treatment modalities. However, in order to achieve

durable remission or a cure, patients often need to undergo HSCT. Despite the curative potential of HSCT, approximately 40% of AML patients relapse. For these relapsed, post-transplant patients, targeted therapies are often the most effective treatment available, yet are limited by their on-target toxicity.

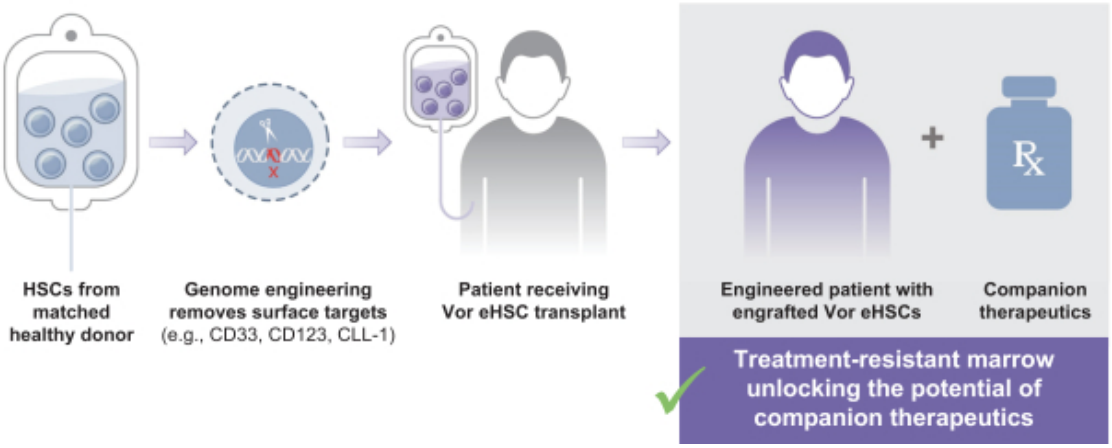
The traditional tumor target paradigm aims to treat hematological malignancies such as AML by focusing on the specificity and potency of therapies that kill cancer cells expressing a target. However, there are very few viable targets that are tumor-specific, as healthy cells usually express these same targets alongside cancer cells. While technologies may improve the specificity of target binding and next-generation modalities such as bispecific antibodies and CAR-T therapies may enhance potency, we believe these approaches are subject to the same fundamental biological limitation of on-target toxicity. A number of targeted therapies have failed in clinical development, and those that have succeeded possess limited utility and narrow applicability, in part due to on-target toxicity.

Our Approach—Engineering Patients to Better Fight Their Cancer

Our proprietary platform aims to change the traditional target tumor paradigm by removing target expression from healthy cells, thereby engineering the patient to improve the tumor specificity of targeted therapies. We accomplish this engineering by genetically modifying donor HSCs to remove select surface targets also expressed by cancer cells. By removing these targets, we make these donor HSCs and their progeny treatment resistant to targeted therapies and enable these treatments to selectively destroy cancerous cells while sparing healthy cells. As a result, our eHSCs are designed to limit the on-target toxicities associated with these targeted therapies, thereby enhancing their utility and broadening their applicability. We believe that combining our eHSCs and targeted therapies, such as CAR-T or bispecific antibodies, has the potential to transform the treatment of hematologic malignancies, such as AML and multiple myeloma.

Our approach is depicted in the diagram below. We begin with HSCs sourced from matched healthy donors. We then use genome engineering technology to remove the selected surface molecule that would be targeted with a companion therapeutic in the event of relapse after HSCT. Next, we deliver our eHSCs using the same transplant procedure that is currently the standard of care. After the eHSCs engraft, the engineered patient is primed for administration of the companion therapeutic, if necessary. These eHSCs are designed to be treatment resistant to the companion therapeutic, thereby limiting its on-target toxicity.

Vor treatment approach



Our Proprietary Vor Platform

We built a technology platform to realize our vision of an engineered patient that allows for selective cancer targeting with highly potent companion therapeutics by leveraging our expertise and recent advances in stem cell biology, genome engineering and targeted therapies. Our approach is in stark contrast to conventional approaches that have focused solely on developing the therapeutic and have faced clinical limitations due to toxicities. The key components of our proprietary Vor platform are the following:

- ***Leveraging Stem Cell Biology and Manufacturing Expertise.*** We have built an extensive understanding of the biology of HSCs to enable our eHSCs to retain their cellular viability and functionality during manipulation. In addition, we have built process development expertise centered around HSCs, enabling us to process these cells quickly, precisely, reproducibly and efficiently for patients. HSCT is a unique procedure where donor HSCs are permanently transplanted into a patient. Prior to transplantation, these cells are outside of the donor and the recipient and are therefore amenable to *ex vivo* manipulation, such as genome engineering. We are developing internal GMP manufacturing capabilities to leverage our in-house expertise and to maintain strategic control over the manufacturing process.
- ***Applying Genome Engineering to Hematopoietic Stem Cells.*** Recent developments in genome engineering allow permanent changes to DNA in cells and all their progeny. We have assembled a team with extensive experience in applying genome engineering technologies to HSCs, which display distinct DNA repair mechanisms compared to rapidly dividing cells. Since HSCs are long-lived, we have developed a series of assays designed to minimize and well-characterize any off-target edits. Furthermore, we have tailored our cell manufacturing process to leverage the most suitable genome engineering technologies for the cells we are creating.
- ***Unlocking the Potential of Targeted Therapies.*** We believe our eHSCs are a solution to the lack of tumor-specific targets and enable selective cancer targeting. Our solution allows for treatment with potent agents, such as CAR-T therapies, whose utility and applicability have previously been limited, in part, by on-target toxicity. We are designing and developing companion therapeutics, including VCAR33, that are optimized for use with our eHSCs in the post-HSCT setting.

Our goal is to replace the patient's HSCs with next-generation, treatment-resistant eHSCs that unlock the potential of highly potent targeted therapies by leveraging our platform and expertise. Our platform is adaptive and has the potential to engineer cells, whether autologous or allogeneic, whether collected from mobilized peripheral blood stem cells, bone marrow or cord blood-derived stem cells, and with any human leukocyte antigen ("HLA") matching strategy, such as complete, incomplete or haploidentical matches. We also foresee no barriers to using our eHSCs with any specific conditioning regimen and believe our platform could be used with either myeloablative or reduced-intensity conditioning regimens.

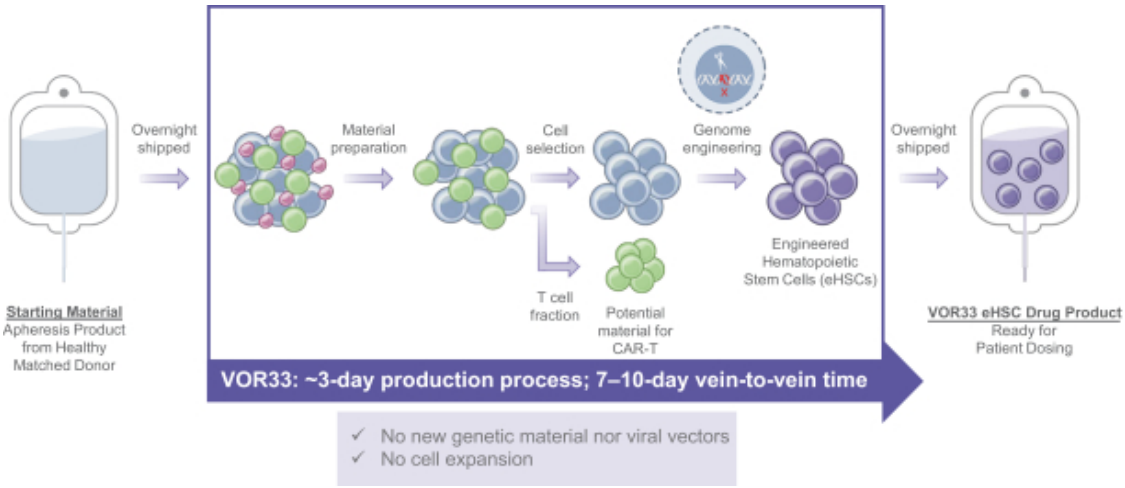
Advantages of Our eHSC Technology

Our eHSC technology is designed to confer advantages and address limitations associated with existing cell therapy processes.

- *Speed—Rapid Manufacturing Cycle and Vein-to-Vein Time.* In contrast to other patient-specific cell therapies, such as CAR-T therapies and gene-modified allogeneic cell therapies, our eHSCs manufacturing is a rapid and elegant process that is completed in approximately three days, enabling a seven-to-ten day vein-to-vein time. The primary reason we can produce eHSCs so quickly is the lack of a need for cell expansion. Our approach to creating eHSCs also does not involve the insertion of new genetic material, thereby avoiding complications related to the use of delivery modalities necessary for gene insertion, such as the viral vectors used in VCAR33 and other CAR-T therapies. The relatively simple and streamlined process of creating our eHSCs provides significant advantages in the required manufacturing infrastructure and we are planning to develop in-house GMP manufacturing capabilities to support planned clinical trials. We believe the efficiency and low capital expenditure of our manufacturing process should translate into higher scalability and a lower cost of goods. We also believe

rapid manufacturing time will also maximize the clinical application of our eHSCs in routine transplant practice.

Vor eHSC manufacturing process



As shown in the figure below, our eHSC manufacturing stands in contrast to other gene modified cell therapies, which can take weeks to produce. We believe our ability to rapidly generate clinical material will enable patients to be dosed with our eHSCs within one week of healthy donor cells being collected. AML patients with minimal residual disease ("MRD") usually rapidly progress in their illness after HSCT and we believe our ability to provide eHSCs in a timely manner will provide sufficient time for these cells to engraft before subsequent companion therapeutics need to be administered.

Key eHSC manufacturing specifications and comparators

	VOR	Current Gene Modified Cell Therapies		
	eHSC Platform	Autologous Gene Engineered HSC	Autologous CAR-T	Allogeneic CAR-T
Manufacturing Cycle Time	~3 days	7 to 14 days	7 to 21 days	N/A
Vein-to-Vein Time	7 to 10 days	21 to 35 days	21 to 42 days	Off-the-shelf
Starting Material	Normal Healthy Donor Cells	Patient Cells	Patient Cells	Normal Healthy Donor Cells
Viral Vector	N/A	Yes	Yes	Yes

- *Precision***.** We have multiple methods available to engineer genes in HSCs, and our approach is flexible with regard to specific genome engineering technologies, enabling us to select the technology best suited to the eHSC we are creating. We perform extensive analyses on the precise nature of the DNA changes introduced by our genome engineering process and prioritize sequences for our guide RNA ("gRNA") based on their ability to direct precise cutting of the targeted gene, leading to its removal. With VOR33, we have observed in preclinical studies that the precision and efficiency of our process is the same in bulk

hematopoietic progenitor cells as in long-term HSCs. We have not observed unintended alterations elsewhere in the genome.

- *Reproducibility and Efficiency.* Our therapeutic model is based on the creation of eHSCs from immunologically matched healthy donors for each patient. As such, we have developed methods that are highly reproducible, not only with respect to the spectrum of genetic alterations introduced, but also with respect to the function of the eHSC cells *in vivo*. For example, as shown in the left graphic below, in preclinical studies analyzing the removal of CD33, we observed that CD33 removal occurred in at least 86% of cells from six independent healthy donors, using two different gRNAs. In addition, as shown in the right graphic below, we observed in other preclinical studies that our process resulted in 88% of eHSCs from 84 single cell colonies, all derived from one independent healthy donor, having removal of CD33 on both copies, or alleles, of the gene, effectively eliminating any expression of CD33. Another 10% had alterations in only one allele and the remaining 2% were unmodified. To provide potential benefit to patients, we must be capable of providing a sufficient quantity of eHSCs to allow efficient engraftment in the treated patients. We believe that if the majority of transplanted eHSCs lack expression of the target protein, then the patient will have sufficient protection from companion therapeutics' on-target toxicities.

Removal of CD33 in HSCs

One of the components of our current manufacturing protocol for VOR33 is the use of CD34-selected T cell-depleted HSCs ("CD34 HSCs") as grafts in the HSCT process. The National Heart, Lung, and Blood Institute ("NHLBI"), in collaboration with the Blood and Marrow Transplant Clinical Trials Network and the National Cancer Institute, is currently sponsoring a Phase 3 clinical trial in patients with acute leukemia or myelodysplasia evaluating the use of CD34 HSC grafts in HSCT in comparison to bone marrow grafts. The trial included 104 patients in the CD34 HSC arm (of whom only 89 received per protocol therapy) and 232 patients in the bone marrow graft arms. The primary endpoint of the trial was chronic graft versus host disease ("GVHD") (moderate/severe) relapse-free survival at 12 months, with secondary endpoints of overall survival, GVHD, relapse-free survival, relapse and transplant-related mortality ("TRM"), which is a general categorization of deaths related to the transplant that do not result from relapse. The NHLBI trial did not observe a statistically significant difference between the CD34 HSC grafts and the bone marrow grafts with respect to the primary endpoint. There was a statistically significantly lower incidence of chronic GVHD in the CD34 HSC arm of the trial, indicating that grafts lacking in T cells were less likely to be associated with these negative immune reactions in transplant recipients. There was also a statistically significantly higher incidence of TRM in the CD34 HSC arm, contributing to poorer overall survival compared to the other arms. In February 2020, preliminary results of the trial were presented orally at a scientific conference. At that time, trial investigators attributed the increased TRM in the CD34 selected arm in large part to higher infectious complications. Further analyses are ongoing as to the exact nature of these infectious

complications, and what, if any, interventions may be available for their prevention or treatment. For example, cytomegalovirus ("CMV") viremia was noted retrospectively to occur in patients on all the arms of this study. Letermovir, the antiviral agent that targets CMV, was not commercially available at the time this study was initiated and thus was not used during the course of this study. Current standard-of-care now routinely uses letermovir as a prophylaxis to prevent CMV viremia/infectious complications. If and as we learn more about the results of the NHLBI trial, we may decide that the clinical trial protocol or manufacturing process for VOR33 merit changes in response to this new information. Any amendments to our manufacturing process or clinical trial protocol to accommodate these changes could introduce delays into our current clinical development timeline, including delays in initiating our first-in-human clinical trial of VOR33. Additional results from this third party trial may also result in enrollment delays. We continue to expect to use CD34 enrichment in manufacturing VOR33 but we are evaluating the potential development of T-cell replete eHSCs if necessary, to address concerns among stakeholders, if any, that may arise from the NHLBI trial. We do not believe the results of the NHLBI trial undermine the fundamental scientific premise of VOR33 nor do we believe these results adversely impact the overall viability of the VOR33 program.

Our Programs

Leveraging our proprietary Vor platform, we are developing eHSCs in which one or more surface targets have been removed from donor HSCs in order to render these cells and their progeny treatment resistant to targeted therapies and to enable these treatments to selectively destroy cancerous cells while sparing healthy cells. Our initial eHSC product candidate and research programs remove surface targets that meet two criteria. First, the surface target must be biologically non-essential. We believe, based on preclinical studies and evidence from genome databases, that eHSCs lacking these surface targets will have no functional difference from unmodified HSCs. Second, the surface target must be well-validated in animal models or human patients as a target for therapeutics whose potential is limited by on-target toxicities. We are pairing our eHSCs with specific companion therapeutics that are independently clinically validated and complement our eHSC programs.

Our proprietary Vor platform has the potential to be deployed to address multiple hematological malignancies, and we are initially focusing on AML given its high level of unmet patient need. Cancer cells in AML patients express high levels of surface targets such as CD33, CD123 and CLL-1. Our initial product candidates, VOR33 and VCAR33, are focused on CD33, which is expressed in cancer cells of approximately 85 to 90% of AML patients. We believe that CD33 is biologically non-essential and can be removed from donor HSCs without loss of stem cell functionality. CD33 is also the target of a therapeutic that has already been approved by the FDA and other therapeutics that are in development by us and others. We believe that we can also apply our approach in indications beyond myeloid malignancies, and we are advancing research programs identifying other potential surface targets and companion therapeutics.

VOR33 for the Treatment of Hematological Malignancies

Overview

VOR33 is our eHSC product candidate designed to transform the standard of care in AML and potentially other hematological malignancies. We intend to initiate a Phase 1/2a trial of VOR33 in AML patients by enrolling the first patient in the second quarter of 2021. To create VOR33, we genetically modify donor HSCs in order to remove the CD33 surface target. In preclinical studies, we observed that the removal of CD33 had no deleterious effects on the differentiation or function of hematopoietic cells, but it rendered these healthy cells treatment resistant to CD33-directed therapies, thereby providing robust protection from these therapies' cytotoxic effects. We intend to develop VOR33 as an HSCT product candidate to replace the standard of care in transplant settings. Once the VOR33 cells have engrafted, we believe that patients can be treated with anti-CD33 therapies, such as Mylotarg or VCAR33, our CAR-T therapy product candidate, with limited on-target toxicity. The key clinical readouts of this trial, which will be the first clinical trial of our eHSCs, are engraftment of VOR33 and hematologic protection from the known myelosuppressive effects of Mylotarg. If successful, this trial will provide important validating evidence of the potential of VOR33 and our broader eHSC approach. We believe that the combination of VOR33 and CD33-directed therapies could lead to durable antitumor activity.

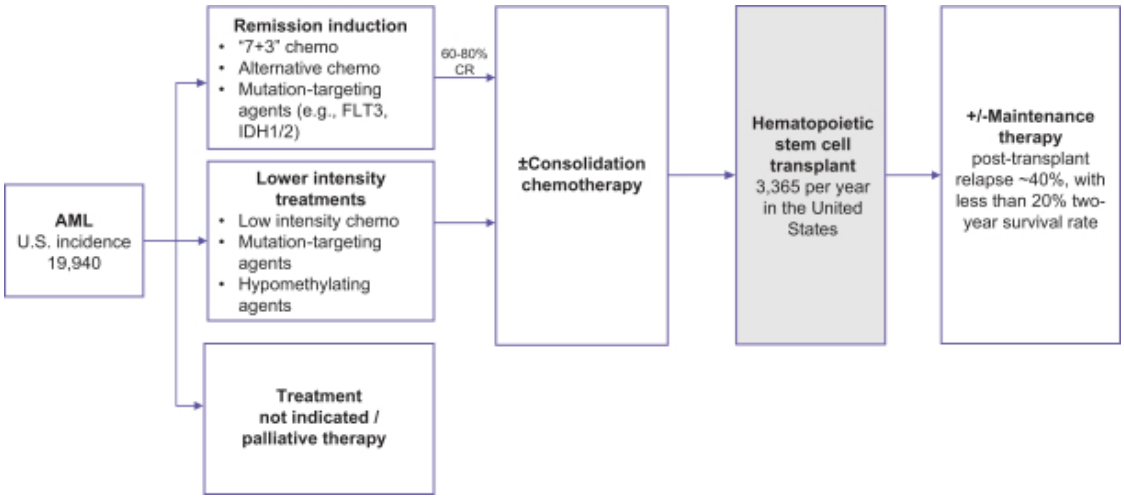
Acute Myeloid Leukemia Overview

AML is the second most common type of leukemia in adults and the most common type of acute leukemia in adults. AML is characterized by excessive proliferation of myeloid stem cells and their failure to properly differentiate into mature blood cells. There are an estimated 42,500 new diagnoses of AML each year in the United States, Europe and Japan. The median five-year survival rate for patients with AML is less than 30%, but there are significant differences in prognosis depending on several factors, including the age of the patient at diagnosis.

Current first-line treatments for patients with AML typically involve aggressive combination chemotherapy regimens with the goal of inducing disease remission for long enough to allow the patient to undergo a potentially curative HSCT. The recommended treatment for AML for patients younger than 60 years and for older patients who can tolerate intensive chemotherapy is a regimen referred to as 7+3, involving seven days of continuous dosing with the chemotherapy agent cytarabine along with short infusions of the chemotherapy agent daunorubicin on days one through three. These intensive chemotherapy regimens are usually not curative, and without post-remission therapy, such as HSCT, AML is likely to return within several months.

A summary of standard HSCT treatment for AML is shown below.

AML treatment flow diagram

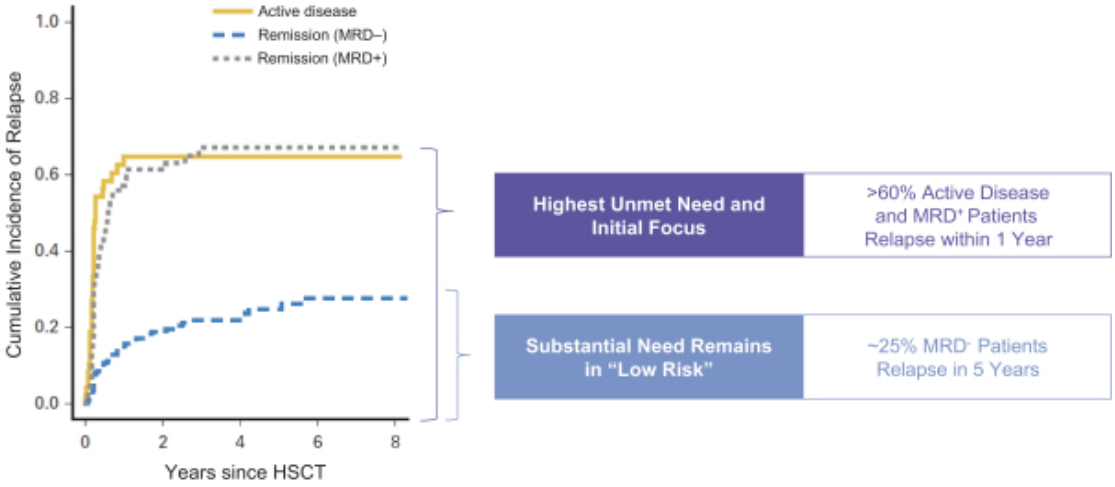


As a first step, patients are treated with a combination chemotherapy regimen to induce initial remission of the cancer. Following this, patients undergo myeloablation, a procedure designed to eliminate more of the remaining tumor cells, but one that also leads to the destruction of the patient's HSCs. These HSCs are then replaced using cells from a matched healthy donor, resulting in reconstitution of the patient's hematopoietic system. In some patients the combination of the myeloablation and the antitumor effects of the transplanted HSCs eliminates residual tumor cells, resulting in durable remission.

Over the past 20 years, there has been an increasing trend in allogeneic transplants for AML, which are transplant procedures in which stem cells are obtained from healthy donors. There were over 16,000 allogeneic HSCT procedures performed in the United States between 2013 and 2017 for the treatment of AML. AML was the most common disease treated by allogeneic HSCT, representing over 35% of all allogeneic HSCT procedures performed during this time period.

Unfortunately, in approximately 40% of AML patients who undergo HSCT, some tumor cells persist and the patient relapses. As shown in the figure below, AML patients treated with HSCT who, prior to HSCT, had MRD had an even higher relapse rate of 67%, with the vast majority of these patients relapsing within one year. Patients who had MRD negative disease, meaning that the number of tumor cells had been reduced to a level of approximately 0.1% of cells in a bone marrow sample, had a much lower and slower risk of relapse.

AML patients with residual cancer cells are at higher risk of rapid relapse

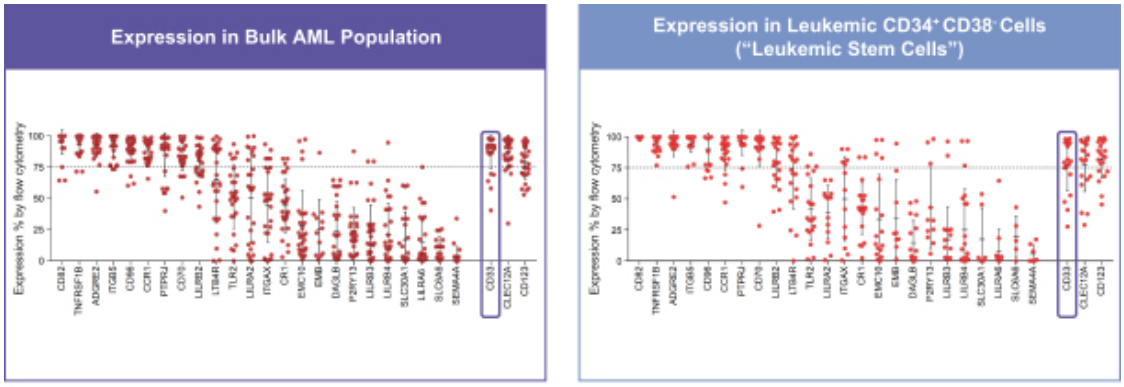


Patients who relapse after HSCT are left with limited post-transplant treatment options. Therapies targeting surface molecules of tumor cells, such as Mylotarg, have been shown to be effective in slowing the advance of AML after HSCT. However, the utility and applicability of Mylotarg and other targeted therapies have been limited by on-target toxicity. Unfortunately, due in part to stagnant innovation in HSCT and limited post-transplant treatment options, the post-transplant survival for AML patients is approximately 44%, based on AML outcomes in the National Cancer Database from 1998 to 2011. Approximately 10,000 patients in the United States die from AML each year.

CD33 Targeted Therapies

A number of biologics investigated by third parties as potential therapeutics in AML and other hematopoietic malignancies have been based on targeting CD33, which, as shown in the figures below, is expressed, on average, in between approximately 85 to 90% of bulk AML patient samples and over 75% of leukemic stem cells.

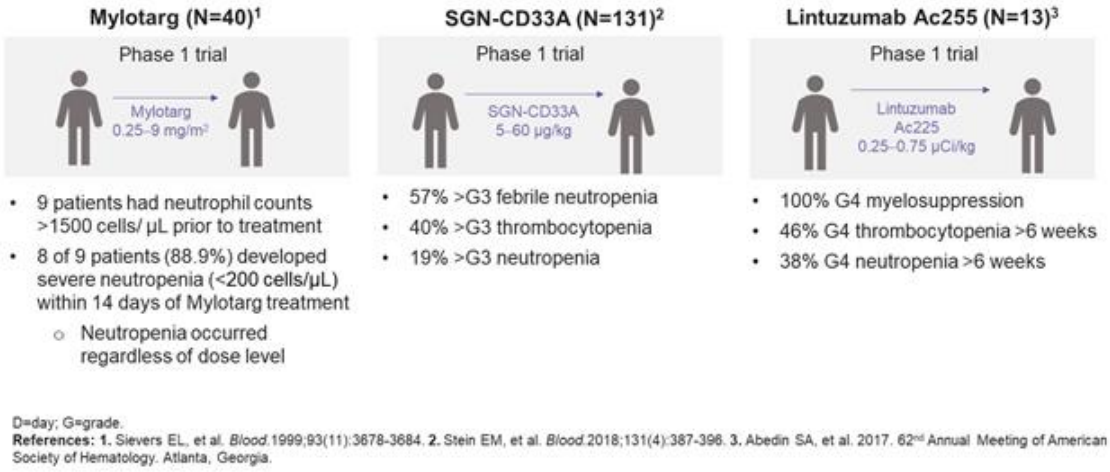
Rate of expression in bulk AML patient samples and leukemic stem cells



Perna, Sadelain et al, Cancer Cell 2017

CD33 is an attractive target for the development of AML therapeutics based on preclinical and clinical results from third parties demonstrating the ability of anti-CD33 directed therapies to deplete tumor cells. However, CD33-directed therapeutic approaches have had limited impact in improving the prognosis of patients with AML due in part to on-target toxicity. This on-target toxicity can have myelosuppressive effects, such as neutropenia, which is an abnormally low number of certain white blood cells, and thrombocytopenia, which is an abnormally low number of platelets. A summary of certain myelosuppressive effects observed in early-stage trials of selected CD33-directed therapies is shown below.

Third-party CD33-directed products and myelosuppressive effects



D=day; G=grade.

References: 1. Sievers EL, et al. *Blood*.1999;93(11):3678-3684. **2.** Stein EM, et al. *Blood*.2018;131(4):387-396. **3.** Abedin SA, et al. 2017. 62nd Annual Meeting of American Society of Hematology. Atlanta, Georgia.

The only CD33 targeted therapy approved by the FDA for the treatment of AML is gemtuzumab ozogamicin ("GO"), which is marketed by Pfizer under the brand name Mylotarg. Mylotarg is an antibody drug conjugate ("ADC") that targets CD33 on AML cells and is designed to deliver a potent cytotoxin directly to tumor cells. However, due to the expression of CD33 on a broad set of hematologic progenitor cells, Mylotarg not only attacks AML cells, but it also depletes healthy blood cells, including HSCs and other progenitor cells that express CD33. Two well-known consequences of this on-target toxicity are thrombocytopenia, or low levels of platelets, leading to bleeding disorders, and neutropenia, or low levels of white blood cells, leading to an increased risk of infection in already frail patients. Primarily due to its toxicity profile, Mylotarg is currently used only in a limited setting, in both first line and relapsed/refractory disease. Without a solution to the problem of CD33 on-target toxicity, we expect all CD33-targeted therapies to produce thrombocytopenia and neutropenia which may result in the same limited clinical utility as Mylotarg.

Our Solution to CD33 On-Target Toxicity: VOR33

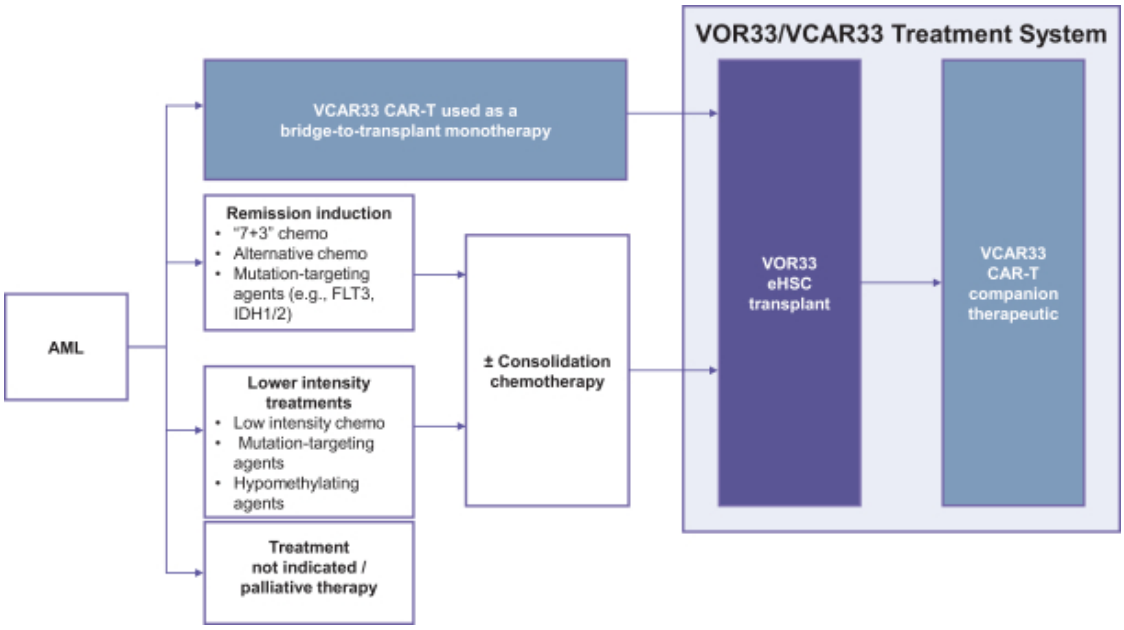
We believe engineering the patient to remove CD33 is a unique approach designed to protect from on-target toxicity and unlock the potential of CD33 as a therapeutic target. We engineer the patient by modifying donor HSCs in patients undergoing HSCT. Our CD33 eHSC product candidate, VOR33, has CD33 genetically removed prior to transplant. In preclinical studies, we observed that the removal of CD33 rendered these healthy cells treatment resistant to CD33-directed therapies, thereby providing robust protection from these therapies' cytotoxic effects. In addition, removal of CD33 had no measurable deleterious effects on the differentiation or function of these cells. We believe that the combination of VOR33 and CD33-directed companion therapeutics could lead to durable antitumor activity in AML and potentially other hematological malignancies.

Our Solution to Transforming Patient Outcomes: The VOR33/VCAR33 Treatment System

We believe VOR33 could unlock the potential of anti-CD33 therapies that are much more potent than Mylotarg. CAR-Ts are highly potent therapeutic agents, and we believe administration of a CD33-targeted CAR-T will cause myeloablation and severe on-target toxicities in the absence of a solution such as VOR33. We licensed a CD33-directed CAR-T, VCAR33, from the NIH to take advantage of the opportunity for highly potent agents created by VOR33. We believe VCAR33 could be a highly potent anticancer therapy that, when combined with VOR33, is not associated with severe myeloablative toxicities. Moreover, we believe VCAR33 could be used as a bridge-to-transplant monotherapy, meaning as a means for patients with active disease to achieve pathologic remission and become eligible for potentially curative transplant. We believe the VOR33/VCAR33 Treatment

System is a novel and comprehensive approach that has the potential to transform clinical outcomes and establish a new standard of care for patients suffering with AML.

VOR33 and VCAR33 in AML



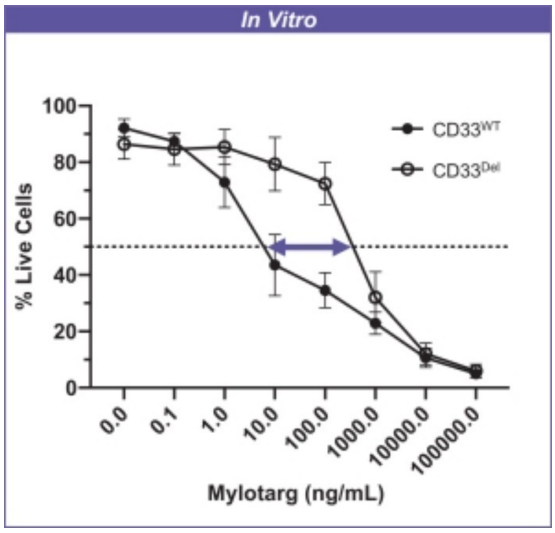
VOR33 Preclinical Data

Preclinical Proof of Concept

In preclinical studies, we observed the resistance of our eHSCs to Mylotarg. As shown in the left figure below, we used *in vitro* cytotoxicity assays to measure the effects of various concentrations of Mylotarg on HSCs and their progeny (collectively, "HSPCs") that have differentiated into myeloid lineage cells. These concentrations were not based on the labeled dose of Mylotarg, which entails induction doses of between 3 to 6 mg/m^2 and continuation doses of 2 to 3 mg/m^2 dependent on indication. At these labeled doses, myelosuppression in human patients is typically observed within two weeks of initial dose. Clinical use typically follows these dosing recommendations though can deviate based on observed toxicities and clinical response. In our study, we tested both wild type cells whose CD33 surface targets had not been manipulated ("CD33^{WT}") and cells that we had genetically engineered to remove CD33 ("CD33^{Del}"). We observed that CD33^{Del} cells had an approximately 70-fold increase in

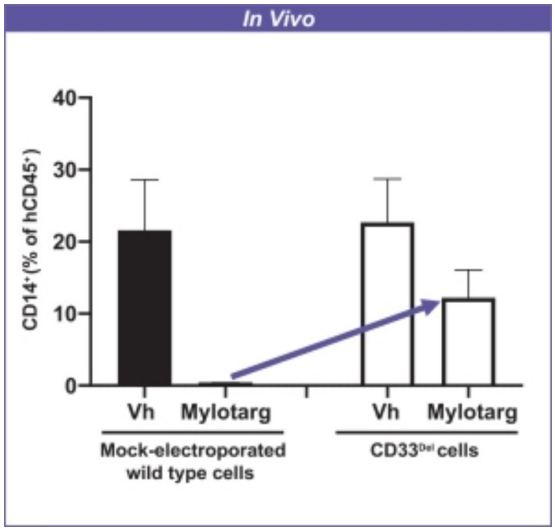
IC_{50} in comparison to $CD33^{WT}$ cells and, as expected, observed few differences in cell killing at extreme Mylotarg concentrations.

Mylotarg Cytotoxicity on $CD33^{WT}$ and $CD33^{Del}$ HSPCs



We conducted additional *in vivo* studies to assess the response of different classes of $CD33^{Del}$ blood cells in the presence of Mylotarg in a long-term (16-week) transplant study, in which human HSPCs were engrafted into 15 immune-compromised mice, with 15 mice used as a vehicle treated ("Vh") control group. We investigated the impact of Mylotarg on $CD14^{+}$ monocytes derived from these human HSPCs since $CD14^{+}$ monocytes naturally express CD33 on their surface. As shown in the figure below, we observed that in the vehicle-treated groups, there was significant loss of $CD14^{+}$ cells, while that population of cells was largely intact in the $CD33^{Del}$ arm, leading to a 61-fold higher $CD14^{+}$ cell frequency in the $CD33^{Del}$ arm compared to the mock electroporated arm.

$CD33^{WT}$ and $CD33^{Del}$ HSC survival after exposure to Mylotarg



We believe that our preclinical studies provide strong support for the potential of using eHSCs to replace the standard of care of HSCT patients. These studies provide evidence of the resistance of $CD33^{Del}$ eHSCs and progeny to anti-CD33 therapies. Our data suggest that using $CD33^{Del}$ eHSCs in HSCT could enhance the utility and broaden the applicability of CD33-directed therapies, such as Mylotarg or anti-CD33 CAR-T therapies, by lowering the risk of on-target toxicities on the patient's newly engrafted hematopoietic system.

Removal of CD33—No Observed Impact on Biology

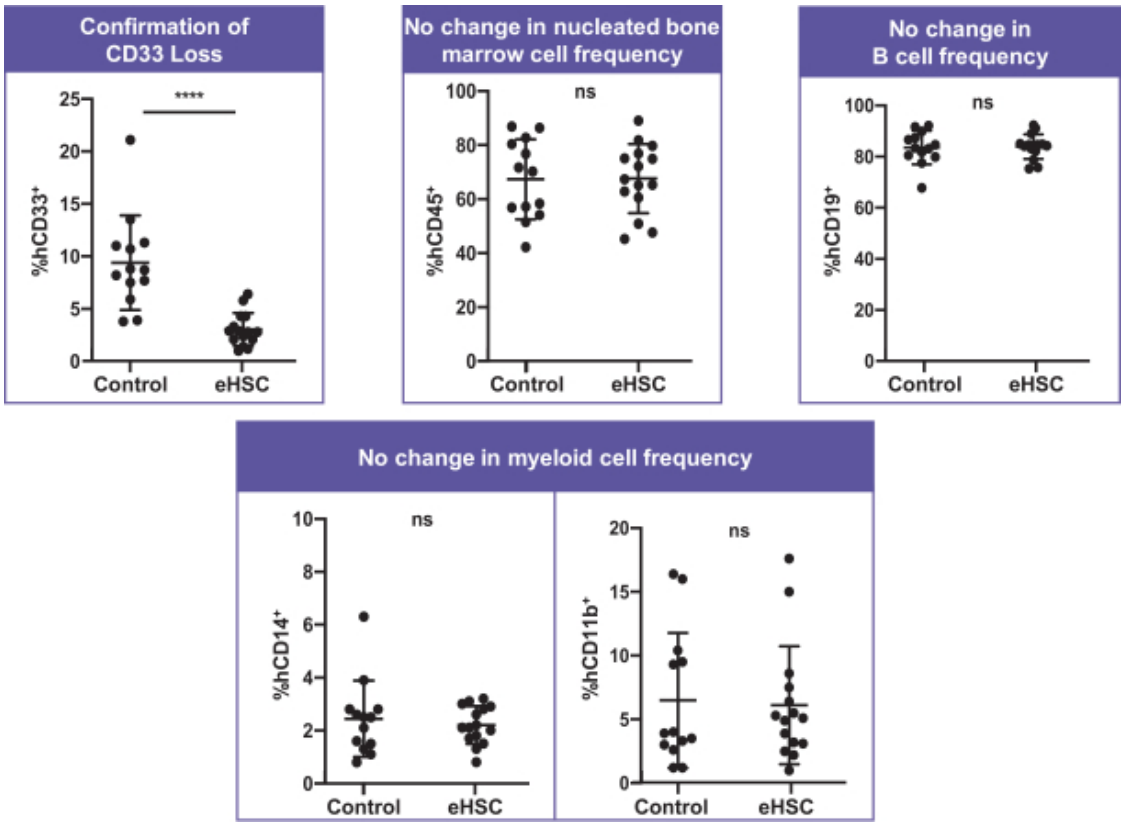
We believe, based on pioneering academic work performed by the chair of our Scientific Advisory Board, Dr. Siddhartha Mukherjee, on our own preclinical studies and on data from human genetics databases, that the CD33 surface target can be removed from HSCs without any deleterious impact on cell biology.

Dr. Mukherjee and his colleagues at the Columbia University Herbert Irving Comprehensive Cancer Center observed in *in vitro* studies that the gene for CD33 could be removed in HSCs without adverse effects on cell differentiation or immune function. It was observed that these $CD33^{Del}$ eHSCs were able to differentiate into various classes of hematopoietic cells such as neutrophils, monocytes and dendritic cells with the same distribution as unmodified HSCs. Furthermore, the cytokine responses of cells derived from eHSCs to immunostimulatory agents, such as lipopolysaccharide, were indistinguishable from those derived from unmodified HSCs.

We replicated Dr. Mukherjee's key findings in our own preclinical studies. In order to observe the ability of eHSCs to differentiate into different classes of blood cells, we conducted transplants of human HSCs into 15 immune-compromised mice, which we call a xeno-transplant mouse model, with 15 mice used as a vehicle treated control group. The transplanted cells consisted of $CD33^{Del}$ eHSCs, as well as $CD33^{WT}$ HSCs that acted as a control. We then observed the presence of various types of bone marrow cells at 16 weeks after transplant to measure engraftment and multilineage differentiation of the transplanted human cells in mice. As shown in the top left figure below, we observed statistically significant ($p<0.0001$) lower rates of CD33 surface proteins, suggesting successful genome engineering in $CD33^{Del}$ cells. As shown in the other figures below, we compared the differential potential of $CD33^{Del}$ HSCs to produce nucleated bone marrow cells (identified by the expression of CD45), B cells (identified by the expression of CD19) and myeloid cells (identified by the expression of CD14 and CD11b), to such potential in

CD33^{WT} HSCs. We observed no statistically significant differences in the number of cells of each lineage produced by the CD33^{WT} and CD33^{Del} HSCs.

16-week xeno-transplant mouse model engraftment data of human CD33-engineered cells

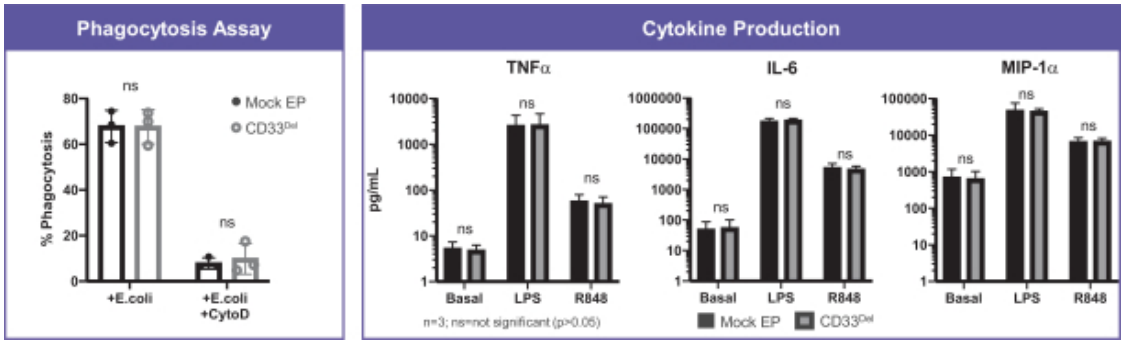


In the charts above and elsewhere in this Annual Report on Form 10-K ("Annual Report"), certain statistically significant results are noted with asterisks. A result is considered to be statistically significant when the probability of the result occurring by random chance, rather than from the efficacy of the treatment, is sufficiently low. The conventional method for measuring the statistical significance of a result is known as the "p-value," which represents the probability that random chance caused the result (e.g., a p-value=0.001 means that there is a 0.1 percent or less probability that the difference between the control group and the treatment group is purely due to random chance). In this Annual Report, except as otherwise noted, results that are not statistically significant are denoted with "ns," a p-value less than 0.05 is denoted by a single asterisk, a p-value less than 0.01 is denoted by two asterisks, a p-value less than 0.001 is denoted by three asterisks and a p-value less than 0.0001 is denoted by four asterisks. Generally, a p-value less than 0.05 is considered statistically significant, and may be supportive of a finding of efficacy by regulatory authorities. However, regulatory authorities, including the FDA, do not rely on strict statistical significance thresholds as criteria for marketing approval and maintain the flexibility to evaluate the overall risks and benefits of a treatment.

In order to observe the ability of differentiated immune cells derived from eHSCs to fight pathogens, we compared the functionality of CD33^{WT} and CD33^{Del} cells *in vitro* in a phagocytosis assay, which measures the activity of immune cells in directly engulfing pathogens, and in a cytokine production assay, which measures blood cell secretions that indirectly fight pathogens. As shown in the bottom left graph, we did not observe a difference in the phagocytosis activity between the CD33^{WT} cells and the CD33^{Del} cells in the presence of *e. coli* bacteria, which

triggers phagocytosis, and of cytochalasin D ("CytoD"), which inhibits phagocytosis. Further, as shown in the bottom right graph, we did not observe differences in cytokine production of each cell type at baseline or in the presence of lipopolysaccharide ("LPS") and resiquimod ("R848"), which are two different types of pathogen triggers.

Cells derived from CD33^{Del} eHSCs and CD33^{WT} HSCs demonstrate intact functionality



In addition, Dr. Mukherjee's lab at Columbia University, as well as academic labs at the University of Pennsylvania and the Fred Hutchinson Cancer Research Center, have each separately tested CD33^{Del} cells *in vivo*. In transplant experiments in mice and non-human primates, each of these groups independently observed no deleterious effects from replacing existing blood cells with CD33^{Del} cells.

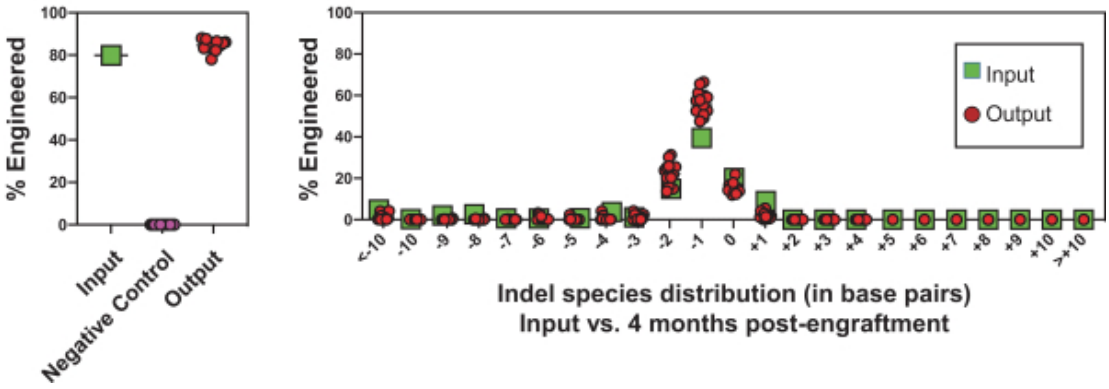
While these preclinical data offer encouraging evidence of the non-essential nature of CD33, we believe the strongest support for our approach comes from existing human genetics data. We have found 65 individuals with homozygous loss of function mutations in the CD33 gene using the genetic database maintained by the Broad Institute. This critical evidence suggests the non-essential nature of CD33 function in humans. We believe this finding of so-called "null mutants" among the adult human population, combined with the lack of discernable *in vitro* and *in vivo* effects observed with the removal of CD33, mitigates concerns associated with introducing CD33^{Del} eHSCs in humans.

Effectiveness of Target Removal

We also studied the effectiveness of our genome engineering technology in creating CD33^{Del} cells. Our expertise in genome engineering allows us to create CD33^{Del} eHSCs using precise modifications with detailed characterization of any off-target edits. For VOR33, we have chosen to use the CRISPR/Cas9 system due to its high rate of gene removal.

In our xeno-transplant mouse model discussed above, we compared the input cells that we introduced into the mice with bone marrow cells after four months of engraftment. As shown in the left figure below, we observed that the editing frequency of the input cells that we introduced was very similar to the editing frequency of bone marrow cells in each of these 15 mice. The persistence of edited cells in this complex *in vivo* environment suggests that CD33-edited cells can persist long-term *in vivo*. We also studied the specific editing spectra by following molecular signatures formed by the DNA repair process. As shown in the right figure below, we observed that the spectra of inserted or deleted DNA, or indels, that characterize the input samples are trackable long-term in each animal. These results suggest that there is no biological pressure to eliminate any specific indel species and that there are no indels which are preferentially selected in the complex biological environment, thereby mitigating concerns of clonal expansion and tumorigenesis.

Editing frequency and indel species distribution observations suggest no adverse selection



VOR33 Clinical Plans

VOR33 with Mylotarg

The clinical strategy for VOR33 is to initially evaluate engraftment and tolerability, then assess clinical activity in subsequent clinical trials. The FDA accepted our IND application for VOR33 in combination with Mylotarg in patients with AML in January 2021 and we expect to initiate the initial clinical trial of VOR33 by enrolling the first patient in the second quarter of 2021. We anticipate initial read out of data regarding tolerability, engraftment and hematologic protection from the known myelosuppressive effects of Mylotarg in late 2021 or in the first half of 2022. If successful, this trial will provide important validating evidence of the potential of VOR33 and our broader eHSC approach.

The primary goals of our planned clinical trial are to evaluate tolerability and feasibility, with a focus on confirming that VOR33 can engraft in patients in a timely manner. Patients will then be eligible for subsequent treatment with Mylotarg, the only FDA-approved CD33 targeted therapy. While this trial is not designed to evaluate the efficacy of the combination of VOR33 and Mylotarg, we may generate data on the incidence of the previously documented hematopoietic toxicities associated with Mylotarg. Any observed protection from such on-target toxicity in this Phase 1/2a trial would serve as an important proof of principle for our research and development platform.

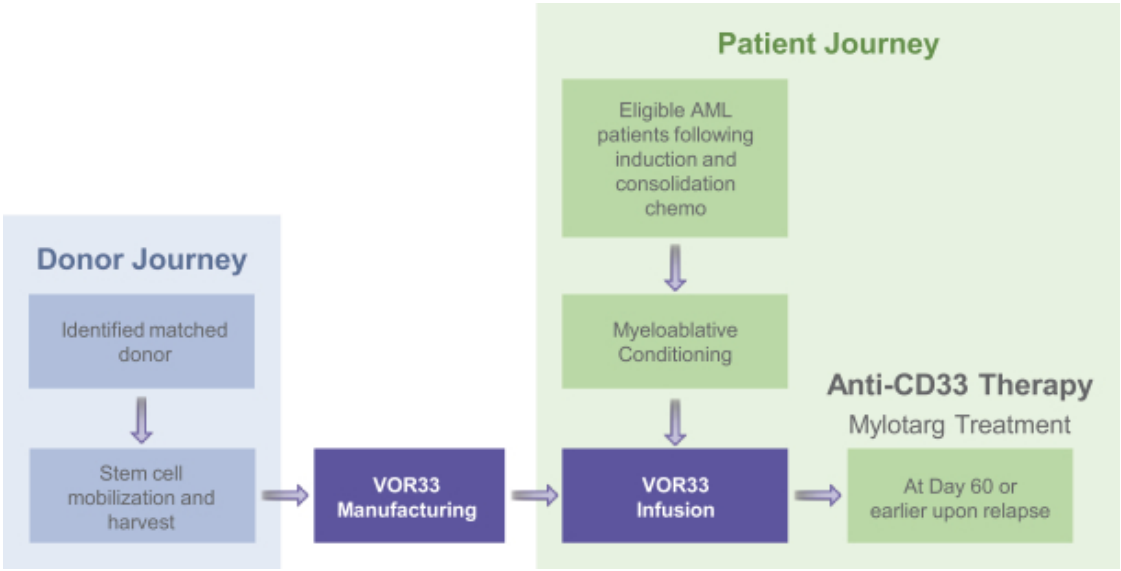
We expect our VOR33 Phase 1/2a trial to enroll CD33 positive AML patients who are at a high risk of relapse. We will start our screening process with patients who have achieved morphologic remission, which means they have no detectable AML blasts in peripheral blood. These patients must express CD33 in their blood cells, which we expect to be present in approximately 85 to 90% of patients. As part of routine clinical practice, genetic profiling will also be used to identify those patients who have disease markers associated with a high risk of disease relapse, such as MRD status. After the primary disease in these patients is put into remission, we expect a substantial number of patients will have MRD or other disease markers showing high risk of relapse and therefore will be candidates for VOR33.

To administer VOR33, HSCs from matched healthy donors will be isolated, engineered into VOR33 and then introduced into patients following myeloablative conditioning. We expect that engraftment of VOR33 will occur within 28 days of administration, which occurs in over 90% of standard HSCT procedures. As a safety measure, we will freeze and preserve a portion of the original donor cells to use in case of the failure of VOR33 to engraft. At day 60, we will re-evaluate patients for disease status. Those patients with successful VOR33 grafts who experience relapse of their AML will then become eligible to be treated with therapeutic doses of Mylotarg. Other patients will be treated with maintenance doses of Mylotarg once a month for four months to address any remaining MRD.

We expect the key analytical and clinical read outs of our planned Phase 1/2a clinical trial to include the following:

- ***Engraftment.*** Hematologic cell counts will be assessed following transplant with the expectation that absolute neutrophil cell counts will be greater than or equal to 500/mm3 by day 28 post-transplant.
- ***Tolerability.*** VOR33 will be evaluated for tolerability by assessing the incidence and severity of graft versus host disease and incidence of graft failure.
- ***Mylotarg Toxicities.*** Patients receiving Mylotarg usually exhibit significant myelosuppression within one to two weeks following dosing. Patients will be monitored for neutrophil cell counts following Mylotarg dosing.
- ***Clinical Activity Observations.*** Following Mylotarg treatment, patients will be monitored for the presence of MRD, which are biomarkers in bone marrow indicating remaining presence of cancer. MRD positivity is a strong predictor of AML relapse, and change from MRD positive to negative status would be clinically meaningful. In addition, patients will be assessed for the incidence of relapse-free survival and overall survival.

Outline of the planned first-in-human trial of VOR33 in AML patients



VOR33 with Other Companion Therapeutics

We chose Mylotarg as the initial companion therapeutic for our planned Phase 1/2a trial because it is the only anti-CD33 therapy approved by the FDA. We believe that other anti-CD33 therapies that are not yet approved, such as our VCAR33 product candidate or bispecific antibodies, may ultimately be better companion therapeutics due to higher expected potency and target specificity. We believe that the hematological toxicities that have been observed with anti-CD33 therapies are due to the expression of CD33 on normal HSCs, which results in on-target toxicity. Different therapeutics may also be more suitable in various clinical settings and disease states. We therefore plan to support research and development efforts studying the benefits of VOR33 and other eHSC approaches with several companion therapeutics using different treatment modalities. This strategy is intended to optimize the potential for VOR33 and other eHSC programs to eventually become a new standard of care in transplantation, unlocking the potential of multiple companion therapeutic tools for patients with AML and other hematological malignancies.

VOR33 and Myelodysplastic Syndrome and Myeloproliferative Neoplasm

We believe that VOR33 has potential as a patient-protective agent in combination with treatments of other hematologic malignancies that overexpress CD33, including myelodysplastic syndrome ("MDS") and myeloproliferative neoplasm ("MPN"). MDS consists of a spectrum of bone marrow cancers that are characterized by reduction in blood cell counts and an increase in immature blood cells in bone marrow. This condition evolves into AML in up to 30% of cases. Similarly, MPNs are a group of blood cancers such as chronic myelogenous leukemia, chronic neutrophilic leukemia, polycythemia vera, primary myelofibrosis and essential thrombocythemia where excessive fully differentiated blood cells are produced by the bone marrow, and these conditions may also evolve into more aggressive AML. Patients with these conditions can be segmented into different risk categories based on cell counts and cytogenetics, with intermediate- or high-risk patients often treated with HSCT, and together MDS and MPN are the most common indications for allogeneic HSCT outside of AML. Although this malignancy is not treated by anti-CD33 therapy today, scientific evidence produced by third parties shows that blast cells responsible for MDS and MPN express CD33 and other myeloid cell surface targets. We believe VOR33 has the potential to provide a therapeutic window that enables anti-CD33 therapies to be effective in those settings, and we are exploring the potential use of VOR33 in combination with companion therapeutics in these indications.

Extension of Our Approach to Other Targets

Our vision enabling anticancer therapies extends beyond CD33 and we believe that we will be able to apply our eHSC technology to other targets. There are several other proteins that are expressed on hematologic malignancies and for which therapies have been developed, only to be discontinued in clinical development due to toxicities that impact healthy hematopoietic cells. We are assessing the potential of creating eHSC solutions to these problems through a systematic approach based on our experience in developing VOR33.

- *Target Selection*. We identify a potential target based on its high expression in specific tumors that are routinely treated using HSCT and where the target of interest is also expressed on normal hematopoietic cells. We mine available human genomic databases for evidence that individuals have naturally occurring mutations that may inactivate genes for this target, suggesting that our genetic alteration of the target will not lead to any deleterious effects. We prioritize targets for which an existing target-specific therapy is already available as an approved drug or is in clinical development by others. We anticipate that in the future we will, in parallel, develop eHSCs and bring novel potential companion therapeutic candidates into clinical development either on our own or through collaborations.
- *Gene Inactivation Strategy*. We explore different approaches to inactivating genes and assess multiple options to select the method that results in precise gene alterations and the highest yield. We conduct extensive analyses of engineered HSCs to assess genome engineering efficiency and the degree of off-target gene alterations.
- *Biological Proof-of-Concept***.** We examine the differentiation patterns of eHSCs compared to unmodified HSCs to determine if our gene modifications result in any alterations in the distribution of progeny cells. We test the ability of cells derived from eHSCs to respond to standard stimuli and retain normal cellular function. We then assess the ability of our eHSCs to evade targeted therapies in both *in vitro* and *in vivo* assays.

VCAR33 for the Treatment of Hematological Malignancies

Overview

VCAR33, developed originally at the NIH, is a CAR-T therapy designed to target CD33. It is currently being studied by the NMDP in a multi-site Phase 1/2 clinical trial for young adult and pediatric patients with relapsed/refractory AML as a monotherapy in a bridge-to-transplant setting. We expect investigators to report initial clinical data in 2022. VCAR33 uses a CAR moiety that recognizes CD33 on the outside of the cell surface using the huM195 CD33 binder. The same binder was used in lintuzumab, which is an agent that has been tested in clinical trials and demonstrated clinical activity. We believe VCAR33 is an excellent complement to VOR33 as a

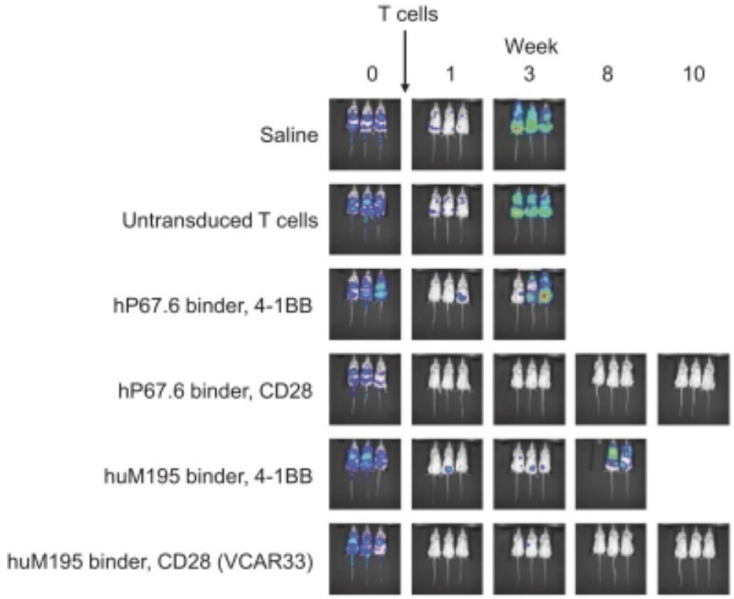
companion therapeutic in the VOR33/VCAR33 Treatment System. In addition, we plan to continue development of VCAR33 as a monotherapy for AML.

VCAR33 complements VOR33

Preclinical Proof of Concept

The NIH conducted preclinical studies to assess the ability of various CAR-T constructs, including a construct using the huM195 binder, to clear human AML tumor cells implanted in mice. These CAR-T constructs, as well as a saline solution and untransduced T cells used as controls, were administered to mice that were then observed over the course of a 10-week period. As shown in the figure below, the constructs targeting the 4-1BB costimulatory domain were less active against the AML cells than those containing CD28. In addition, in other studies, the NIH noted toxicity signals in CAR constructs containing the hP67.6 binder, which is the same binder used in Mylotarg. As a result, the NIH choose to take the construct using the huM195 binder and CD28 into clinical development.

Tumor cell clearance of CAR constructs in mouse xenograft models

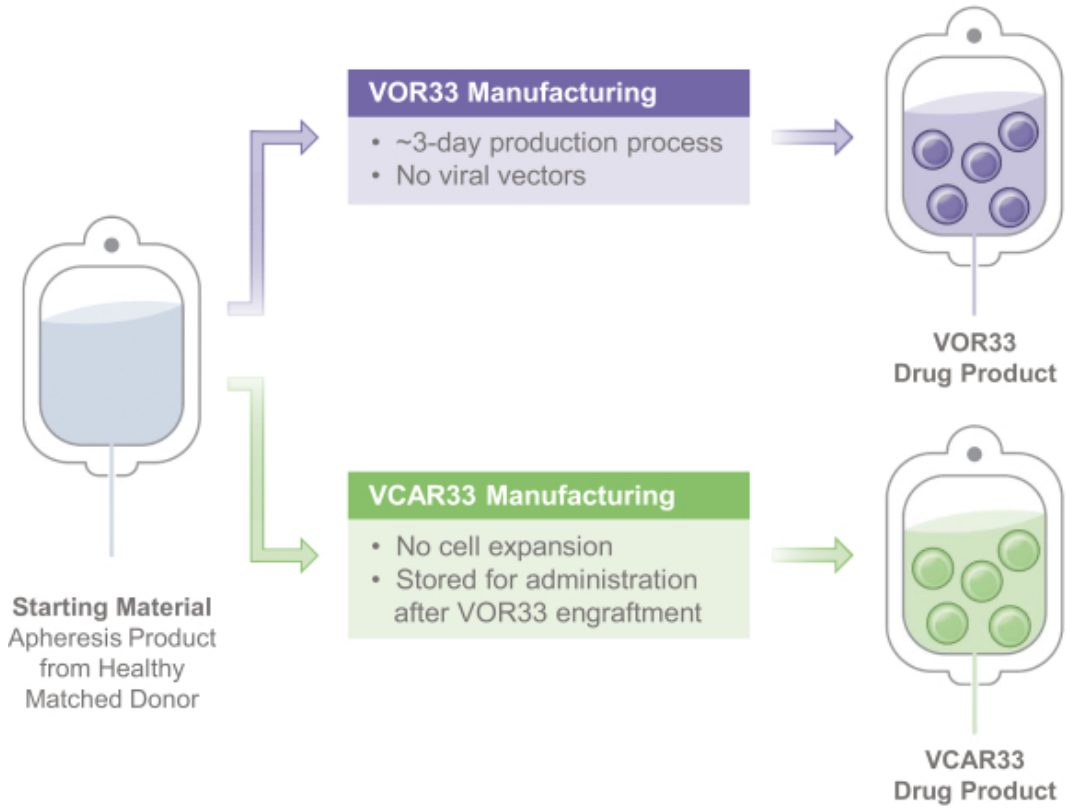


VCAR33 Cell Sources

We envisage that VCAR33 could be used in two different settings with two different sources of starting materials. The first setting is using VCAR33 as a monotherapy in the setting of relapsed/refractory AML, where patients have failed prior lines of therapy and need further treatment to achieve morphologic remission and, if possible, subsequent HSCT. This setting typically sources T cells from the patient (autologous cells).

The second setting could use VCAR33 as a companion therapeutic following eHSC therapy, such as VOR33, where the objective is to cause prolonged remission or cures in patients following transplantation. In this setting, T cells could be sourced from the same cell source as VOR33 (allogeneic cells). A distinct advantage of preparing both the VOR33 and anti-CD33 CAR-T cells from the same donor is that donor-derived T cells should not recognize CAR-T cells as foreign, potentially prolonging persistence. In addition, sourcing T cells from healthy donors may provide a healthier, more abundant cell source, allowing for optimizations and efficiencies in the manufacturing process that are not possible with autologous sources. Unlike autologous CAR-T therapies, the manufacturing of the CAR-T cells would not be rate limiting when combined with VOR33, as the CAR-T therapy would not be needed until 60 days after administration of VOR33.

Production of VOR33/VCAR33 Treatment System from the same donor



VCAR33 Bridge-to-Transplant Clinical Development

VCAR33 is currently being studied by the NMDP as a monotherapy in the bridge-to-transplant setting in a first-in-human Phase 1/2 clinical trial with the aims of evaluating the safety, feasibility and preliminary efficacy of VCAR33 administered to young adult and pediatric patients with relapsed/refractory AML. The trial is running in two phases: the first phase, which is expected to enroll approximately 12 patients, is designed to determine the maximum tolerated dose of VCAR33 using a 3+3 trial design; the second phase, which is expected to enroll up to 16 patients, is an expansion phase designed to evaluate the rate of clinical response to treatment. VCAR33 could cause bone marrow failure due to the elimination of normal hematopoiesis in the absence of an approach that limits on-target toxicity, and therefore, the clinical trial is studying VCAR33 in the bridge-to-transplant setting, where bone marrow failure is manageable with the transplant. Patients are monitored for safety endpoints associated with CAR-T therapy including evidence of cytokine release syndrome, hepatotoxicity and neurotoxicity. Additional endpoints, such as graft versus host disease incidence, treatment-related mortality and time to engraftment, will be assessed post-HSCT to determine the safety of VCAR33 in combination with the transplantation procedure.

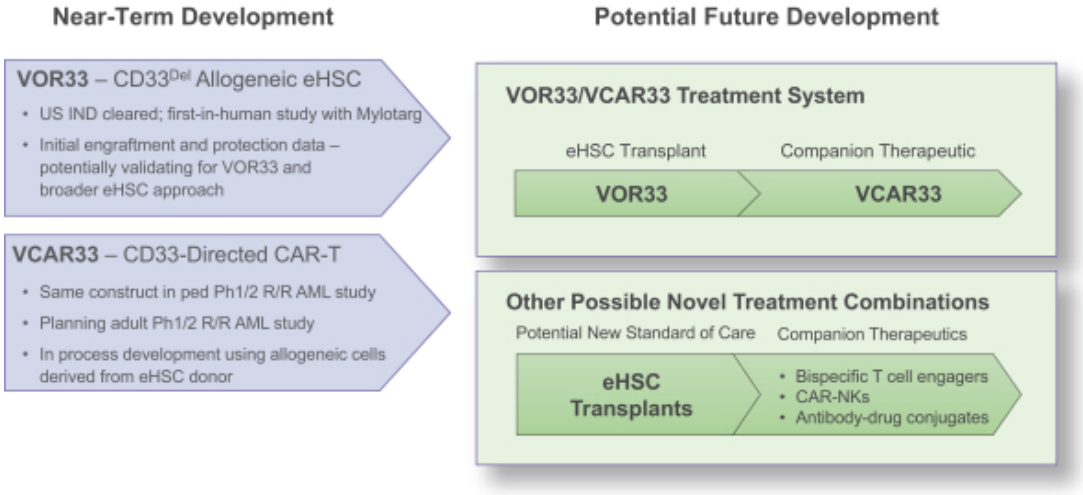
Key clinical efficacy endpoints of the trial include reduction of the blast count in the bone marrow to achieve a morphologic remission, assessment of the elimination of MRD by flow cytometry or molecular methods and the percent of patients consequently able to proceed to a potentially curative HSCT. Standard transplant-related outcomes of the trial including overall survival, relapse rates and event-free survival will be measured. Exploratory objectives will assess VCAR33 performance in patients including expansion and persistence within the blood and bone marrow.

We expect to either assume sponsorship and oversight of the NMDP trial prior to its completion or enter into an agreement with the NMDP providing us with the right to cross-reference the trial results in future IND applications that we may submit to the FDA. In the event we cross-reference these trial results in an IND application for VCAR33, we will be required to demonstrate that VCAR33 is comparable to the T cell therapy studied in the NMDP trial, which will require us to show that our manufacturing processes and construct release specifications are sufficiently similar to those employed in the NMDP trial. In determining comparability, we expect the FDA to evaluate whether and to what extent any changes in our process and specifications are likely to have an adverse effect on the quality, safety and efficacy of VCAR33 in comparison to the T cell therapy studied in the NMPD trial. We believe the T cell therapy being evaluated in the NMDP's trial is comparable to VCAR33 and that the trial, if successful, will support future clinical development of VCAR33. However, the FDA may reject our claim of comparability and the sufficiency of the data to support it, or disagree with our ability to reference the preclinical, manufacturing or clinical data generated by the NMDP trial, and as a result, we may be required to repeat certain development steps undertaken in the NMDP trial if VCAR33 is considered not comparable to its construct. See "Risk Factors—We have not successfully tested our product candidates in clinical trials and any favorable preclinical results are not predictive of results that may be observed in clinical trials." We plan to conduct a company-sponsored VCAR33 Phase 1/2 clinical trial in older patients with relapsed/refractory AML as a bridge-to-transplant monotherapy. We currently expect to initiate this trial after the NMDP reports initial safety and efficacy data from its VCAR33 trial in young adults and pediatric patients. We believe VCAR33 used in the pre-HSCT setting could enable reduced intensity HSCT conditioning regimens, providing the potential for clinical activity with less toxicity, which is important for treating older patients.

VOR33/VCAR33 Treatment System—Clinical Development

We intend to file an IND application with the FDA and conduct a clinical trial of the VOR33/VCAR33 Treatment System after initial results from the VOR33 Phase 1/2a clinical trial and the VCAR33 Phase 1/2 monotherapy clinical trial are reported. We believe demonstration of disease clearance activity by VCAR33 would provide a fundamental rationale for further development in a non-relapse/refractory population which is still high risk, including patients with poor prognostic molecular markers and/or MRD positivity. We would evaluate VCAR33 in a post-VOR33 transplant setting to reduce the risk of recurrence or treat evidence of early relapse. Through use of VOR33, we believe VCAR33 could be used in a post-transplant maintenance setting since CD33 negative hematopoiesis established by the VOR33 graft would be protected from eradication. The objective of this trial would be to assess the safety and initial clinical efficacy of the VOR33/VCAR33 Treatment System.

Plan for establishing eHSC standard of care and enabling treatment combinations



Ongoing Preclinical Programs

We are leveraging our Vor platform to assess the potential of generating eHSCs in which the expression of other surface targets has been removed, including targets such as CD123 and CLL-1. We are generating eHSCs in which these genes have been inactivated individually as well as multiplexed in combination with CD33. In early preclinical studies, we have observed potential evidence of the biological non-essential nature of CD123 and CLL-1 in hematopoietic lineage cells.

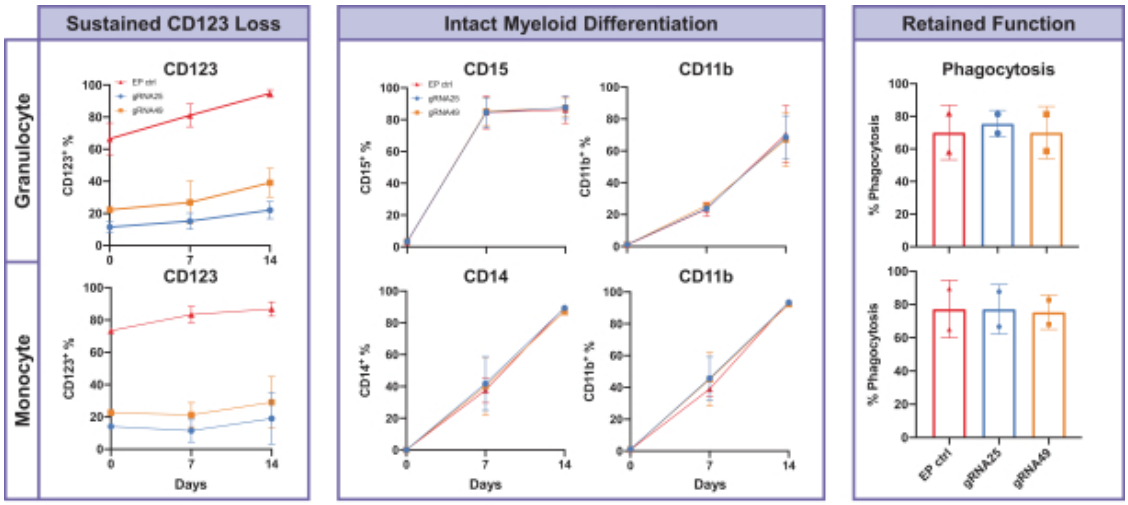
In Vitro Studies

CD123 is widely overexpressed in various hematologic malignancies including AML, MDS, acute lymphoblastic leukemia, hairy cell leukemia, Hodgkin lymphoma and blastic plasmacytoid dendritic neoplasm. Overexpression of CD123 in AML is associated with increased cancer cell replication rate and a poorer prognosis. CD123 is also expressed on multiple normal hematopoietic lineage cells, and treatment-related toxicities have been noted in third-party clinical-stage CD123-directed programs. We believe that removing CD123 from HSCs would limit these on-target toxicities.

In preclinical studies, we have engineered HSCs to remove the CD123 surface target ("$CD123^{Del}$ eHSCs") using a variety of gRNAs and compared these $CD123^{Del}$ eHSCs and their progeny to wild type cells that were not engineered ("$CD123^{WT}$ HSCs"). As shown in the left hand figures below, we measured the CD123 positivity rate of granulocyte and monocyte cells derived from $CD123^{Del}$ eHSCs and from $CD123^{WT}$ HSCs, which served as a control, over a 14-day period. We observed that the level of $CD123^{Del}$ cells remained lower over the 14-day period, suggesting that these blood cells sustained the loss of CD123 over time.

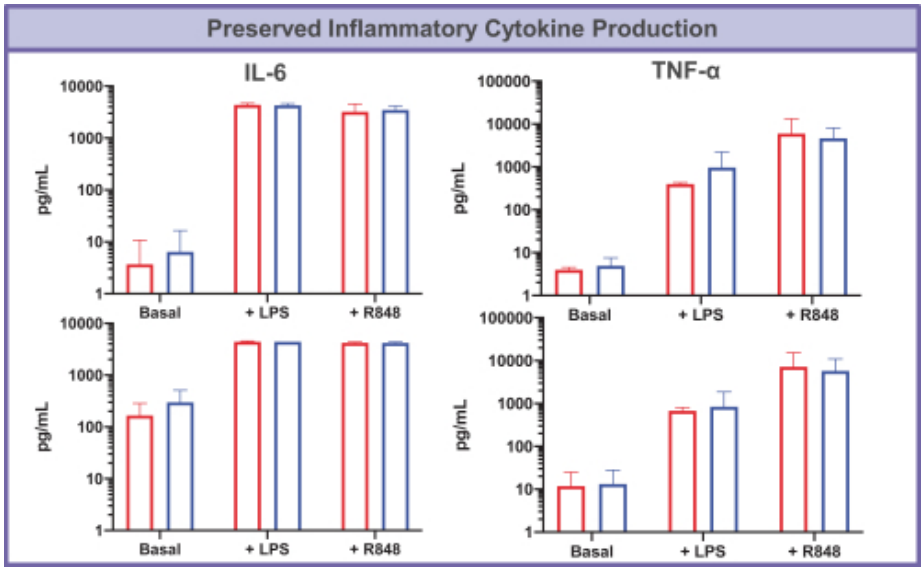
We studied the rate at which $CD123^{Del}$ and $CD123^{WT}$ HSCs differentiated into various classes of blood cells, including CD15 positive, CD11b positive and CD14 positive cells, in *in vitro* assays over a 14-day period. As shown in the upper middle figures below, we observed that $CD123^{Del}$ eHSCs differentiated into these other cells at a rate that was essentially identical to that of $CD123^{WT}$ HSCs. We also employed phagocytotic assays and inflammatory cytokine production assays to study the functionality of the $CD123^{Del}$ eHSCs and of $CD123^{WT}$ HSCs and their progeny. As shown in the figures on the upper right immediately below, as well as the lower figure below, we observed no difference in functionality between the progeny of eHSCs and WT HSCs, suggesting that the deletion of CD123 had no deleterious effects on cellular function.

CD123^{Del} and CD123^{WT} HSCs—differentiation and functional activity of progeny cells



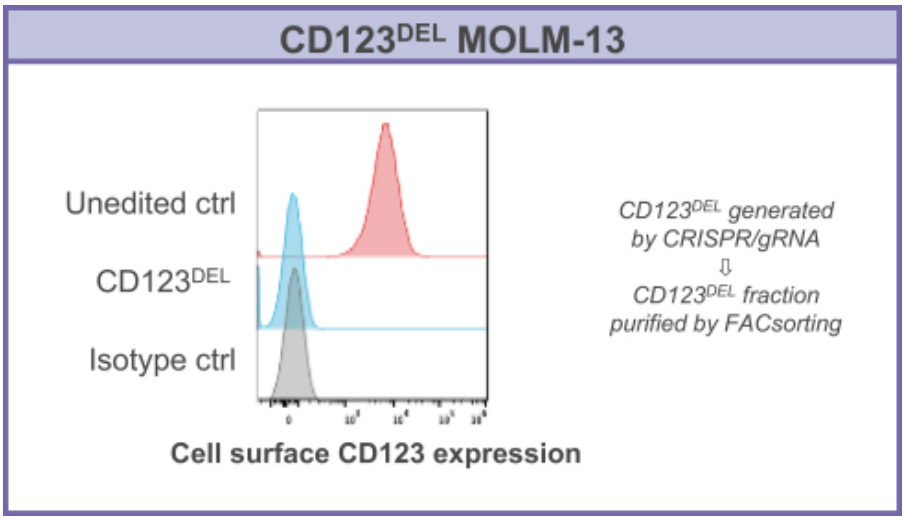
Expression of other markers such as CD33 (myeloid) and HLA-DR (Ag presentation), was not altered by CD123 disruption.

N=2, Mean ± Std Dev



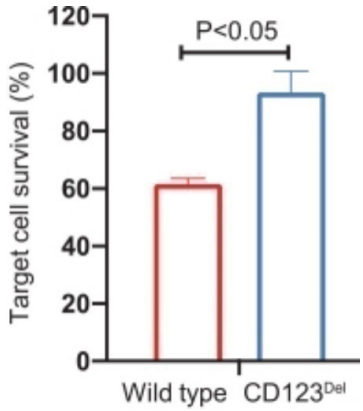
We examined the survival rates of CD123^{Del} MOLM-13 AML cell lines that were exposed to an anti-CD123 CAR-T therapy. We began with MOLM-13 cell lines and removed the CD123 target using CRISPR-Cas9 technology and FACS-based sorting, which is a method of separating blood cells based on cell type and target

expression. As shown in the figure below, the CD123^{Del} MOLM-13 cell lines that we created were comparable in their CD123 expression to the isotypes that were used as controls for the lack of CD123 expression.



The key feature that we observed that distinguished the CD123^{Del} cells from the CD123^{WT} cells was their reaction to exposure to an anti-CD123 agent. As shown in the figure below, we exposed the CD123^{Del} AML cell lines, as well as the CD123^{WT} AML cell lines, to an anti-CD123 CAR-T therapy. We observed statistically significant higher rates of survival in the CD123^{Del} cells when exposed to an anti-CD123 cell agent in comparison to the CD123^{WT} cells. These results suggest that CD123^{Del} cells are better able to survive in the presence of an anti-CD123 CAR-T therapy, which may allow for better outcomes for patients who receive HSCT using CD123^{Del} cells and may unlock the potential of these therapies to address additional indications.

CD123^{Del} cells in the presence of an anti-CD123 CAR-T therapy

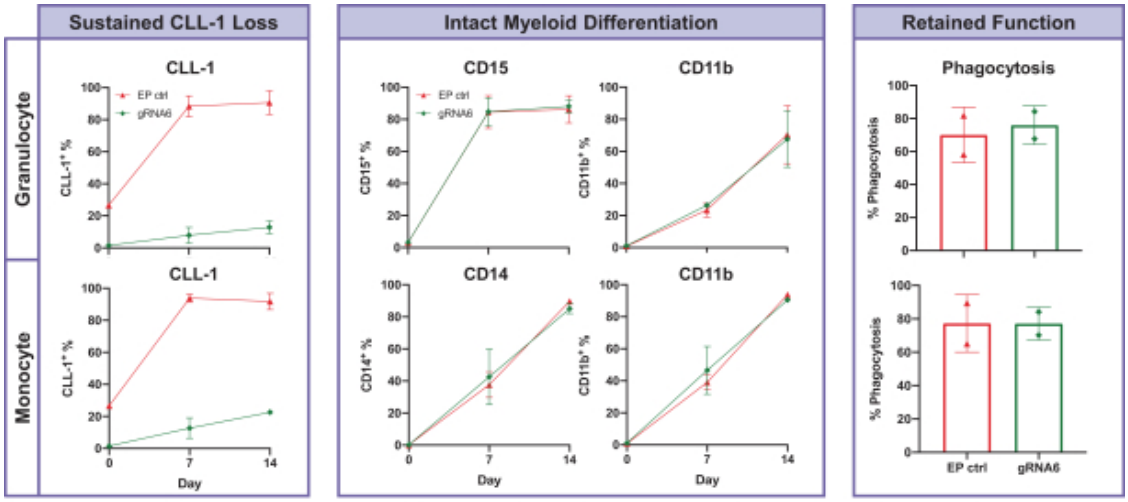


CLL-1 is overexpressed in AML and other hematologic malignancies, which has made it a target for development of anti-CLL-1 CAR-T therapies. However, CLL-1 is also expressed on normal hematopoietic cells such as granulocytes and monocytes. In studies conducted by a third party, an anti-CLL-1 CAR-T therapy was tested in AML patients in the bridge-to-transplant setting. However, administration of these CAR-T therapies was associated with broad suppression of hematopoietic cells and an increased risk of infection.

In preclinical research, we optimized the creation of CLL-1^{Del} eHSCs such that we routinely remove the CLL-1 surface target in the majority of cells. We have also compared the differentiation and function of these modified cells to CLL-1^{WT} cells in *in vitro* assays. As shown in the left figure below, we measured the CLL-1 positivity rate of granulocyte and monocyte cells derived from CLL-1^{Del} eHSCs and from CLL-1^{WT} HSCs, which served as a control, over a 14-day period. We observed that the level of CLL-1^{Del} cells remained lower over the 14-day period, suggesting that these blood cells sustained the loss of CLL-1 over time.

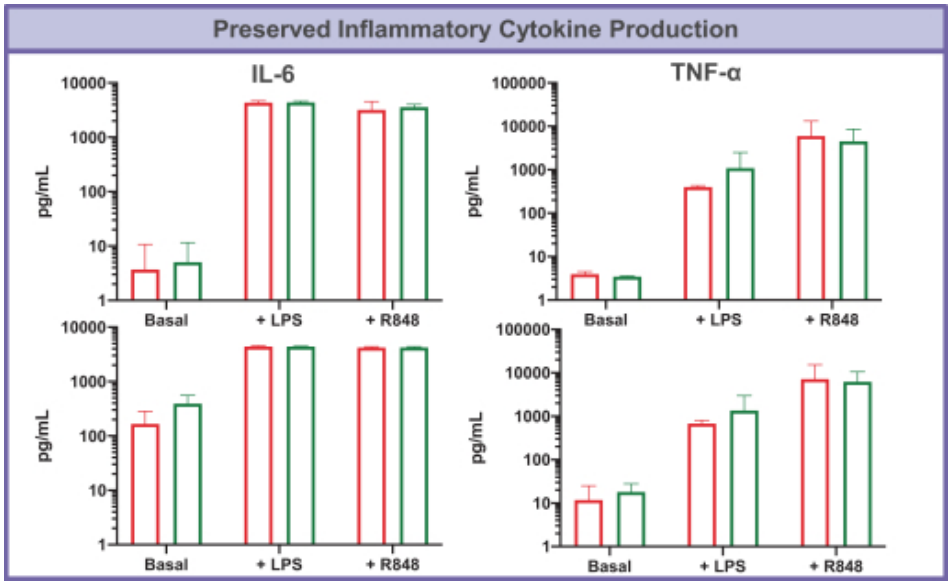
In addition, we studied the rate at which CLL-1^{Del} and CLL-1^{WT} HSCs differentiated into various classes of blood cells, including CD15 positive, CD11b positive and CD14 positive cells, in *in vitro* assays over a 14-day period. As shown in the middle figures below, we observed that CLL-1^{Del} eHSCs differentiated into these other cells at a rate that was essentially identical to that of CLL-1^{WT} HSCs. We also employed phagocytotic assays and inflammatory cytokine production assays to study the functionality of the CLL-1^{Del} eHSCs and of CLL-1^{WT} HSCs and their progeny. As shown in the figures on the upper right immediately below, as well as the lower figure below, we observed no difference in functionality between the progeny of eHSCs and WT HSCs, suggesting that the deletion of CLL-1 had no deleterious effects on cellular function.

CLL-1^{Del} and CLL-1^{WT} HSCs—differentiation and functional activity of progeny cells

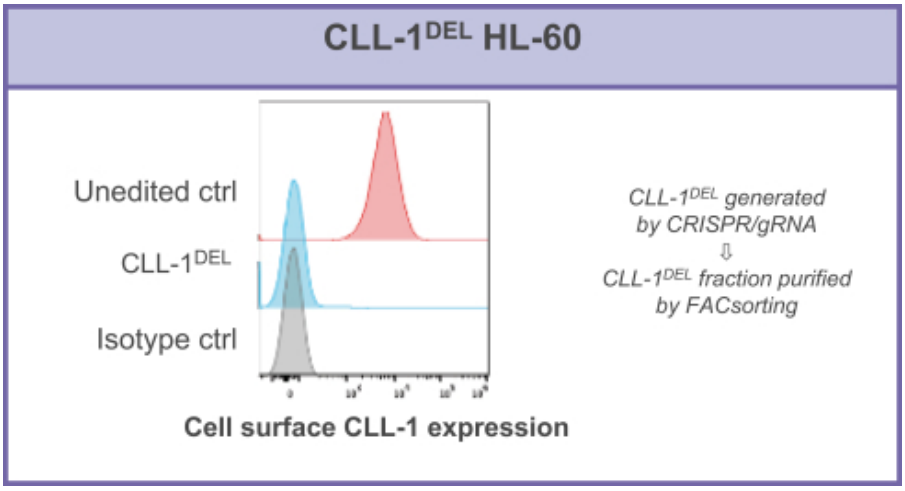


Expression of other markers such as CD33 (myeloid) and HLA-DR (Ag presentation), was not altered by CD123 disruption.

N=2, Mean ± Std Dev

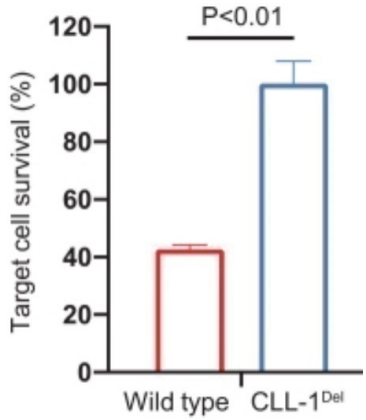


We also examined the survival rates of CLL-1^{Del} HL-60 AML cell lines that were exposed to an anti-CLL-1 CAR-T therapy. We began with HL-60 cell lines and removed the CLL-1 target using CRISPR-Cas9 technology and FACS-based sorting, which is a method of separating blood cells based on cell type and target expression. As shown in the figure below, the CLL-1^{Del} HL-60 cell lines that we created were comparable in their CLL-1 expression to the isotypes that were used as controls for the lack of CLL-1 expression.



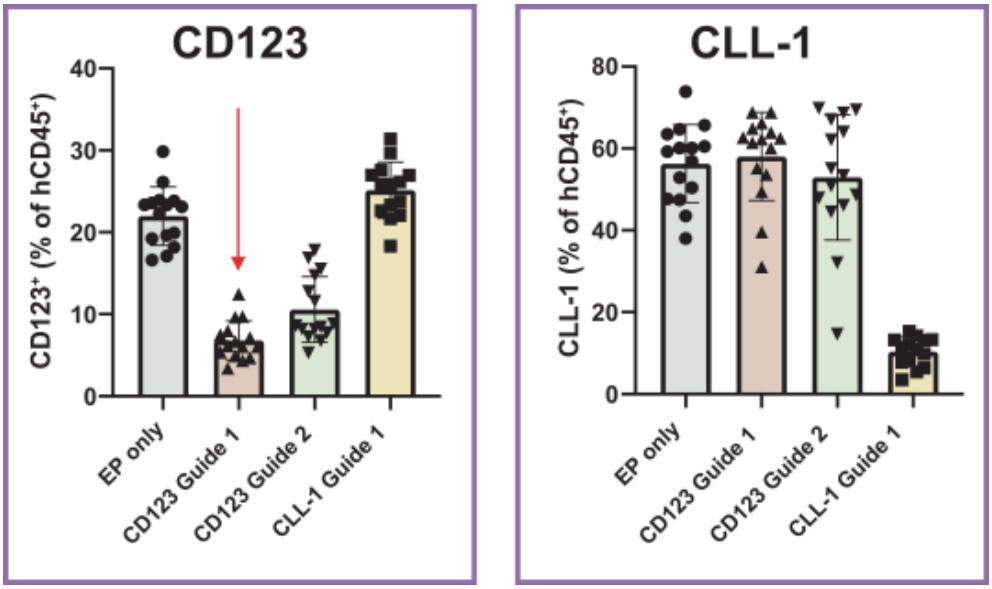
We then exposed the CLL-1^{Del} HL-60 and the CLL-1^{WT} HL-60 cell lines to an anti-CLL-1 CAR-T therapy. As shown in the figure below, we observed a statistically significant higher rate of survival in CLL-1^{Del} HL-60 cell lines compared to CLL-1^{WT} HL-60 cell lines.

Survival rate of CLL-1^{Del} cell lines exposed to an anti-CLL-1 CAR-T therapy



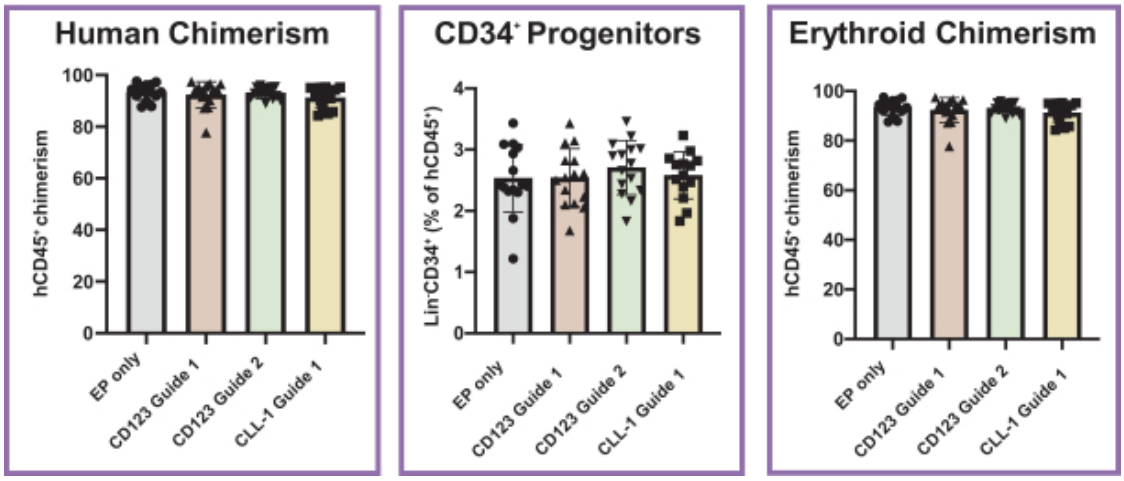
In Vivo Studies

In order to evaluate the viability and functionality of CD123^{Del} and CLL-1^{Del} cells, we created human to mouse xeno-transplant models, consisting of two sets of human CD123^{Del} HSCs and their progeny (collectively, "HSPCs") that were each modified using different gRNAs, of human CLL-1^{Del} HSPCs and of control cells that underwent electroporation ("EP") only. After a period of 16 weeks, we assessed bone marrow cells of the mice for lack of the CD123 and CLL-1 targets. As shown in the figures below, we observed statistically significant reductions in CD123^{+} and CLL-1^{+} cells in mice that had received CD123^{Del} and CLL-1^{Del} HSPCs, respectively. These results suggest that CD123^{Del} and CLL-1^{Del} HSPCs are capable of long-term engraftment in a biologically complex environment.

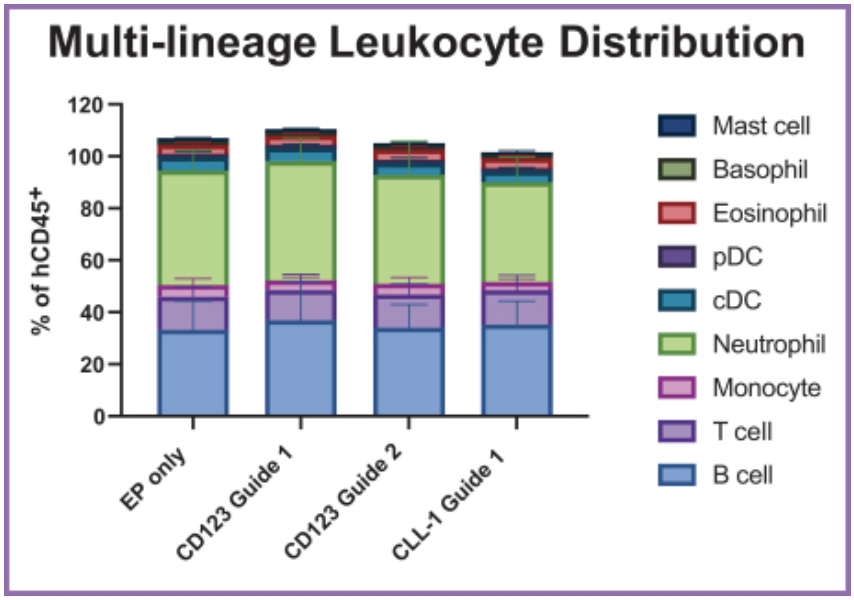


In this same xeno-transplant study, we also measured the proportion of the CD123^{Del} and CLL-1^{Del} HSPCs that contained nucleated cells, as measured by hCD45 or CD235 positivity. As shown in first figure below, we observed no statistically significant differences in the proportion of these cells in the CD123^{Del} and CLL-1^{Del} bone marrow cells in comparison to the EP cells. Our findings suggest that the CD123^{Del} and CLL-1^{Del} HSPCs did not

affect human cell reconstitution after long-term engraftment. Furthermore, as shown in the remaining figures below, the removal of these proteins did not have a statistically significant impact on the presence of hematopoietic precursor cells or erythroid cells in mice with these modified cells compared to mice with EP cells.



We evaluated the multi-lineage leukocyte distribution of the CD123^{Del} and CLL-1^{Del} cells in comparison to the EP cells. As shown in the figure below, we did not observe substantial differences in the distribution of these various cell types among the cells tested, despite the loss of antigens.

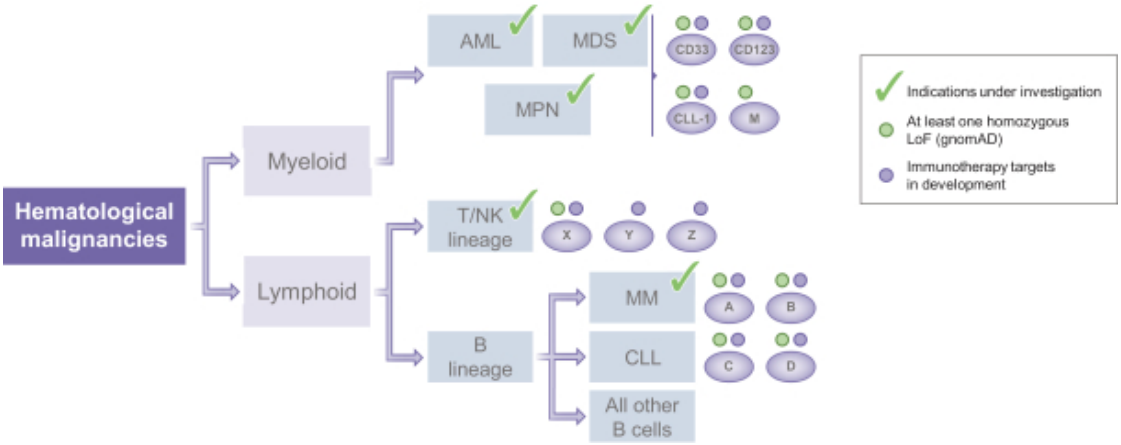


Future Diseases Beyond AML

We believe that our eHSCs have the potential to become the standard of care in hematologic malignancies treated with HSCT. In particular, our eHSCs have the potential to be employed to treat hematological malignancies for which a targeted therapy is available for treatment but is limited by on-target toxicity. As shown in the figure below, we have identified a number of other hematological malignancies that provide the opportunity for our

technology to be employed, and we are evaluating the corresponding targets in our early stage pipeline. We intend to aggressively pursue the creation of additional eHSC product candidates in indications for which our technology shows promise. In addition to AML, our early assessments of surface targets and the therapeutic landscape have indicated the potential of our eHSCs to treat myelodysplastic diseases/myeloproliferative neoplasms ("MDS/MPN"), chronic lymphocytic leukemia ("CLL"), multiple myeloma ("MM") and T and natural killer ("T/NK") cell malignancies.

Vor research pipeline and hematologic malignancies



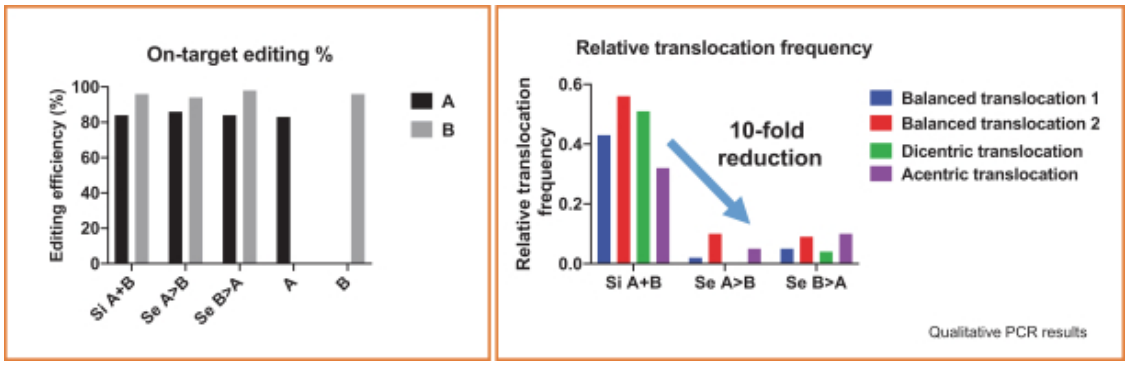
In addition to approaches that rely on target removal, we believe our expertise in genome engineering will enable us to expand our platform to approaches using gene insertion, gene correction and other gene therapy techniques. Using this range of gene engineering technologies on HSCs, we believe we have the potential to address additional types of hematological malignancies beyond those identified above as well as other non-hematological diseases using HSC transplant as a treatment opportunity.

Multiplex Engineering

Multiplex engineering is a strategy and method where multiple genetic targets are engineered within the same cells in the same manufacturing process. Multiplex engineering could allow removal or modification of two distinct genes, thus allowing for companion therapeutics directed at two separate targets to be used in combination or in sequence, which could be particularly valuable to prevent escape mechanisms involving tumor cells down-regulating target expression.

Because multiplex engineering makes multiple edits to DNA, one potential pitfall of this method is a translocation error, which is a gene repair resulting in one DNA segment joining other DNA segments from different parts of the same chromosome or segments of other chromosomes. To attempt to minimize the risks of translocation errors, we are conducting preclinical studies with HSCs that have been edited using different multiplex engineering techniques. As shown in the left hand figure below, we introduced two edits in a cell line in three different timing sequences. In one instance, we induced the edits simultaneously, and in the others we introduced them sequentially. We then compared the on-target editing of those cells with cells that had only one edit. We did not observe any differences in the on-targeting editing profile of the tested cell lines. However, as shown in the figure on the right, we did observe an approximately ten-fold reduction in different kinds of translocation frequency in sequentially edited cells compared to the simultaneously edited cells.

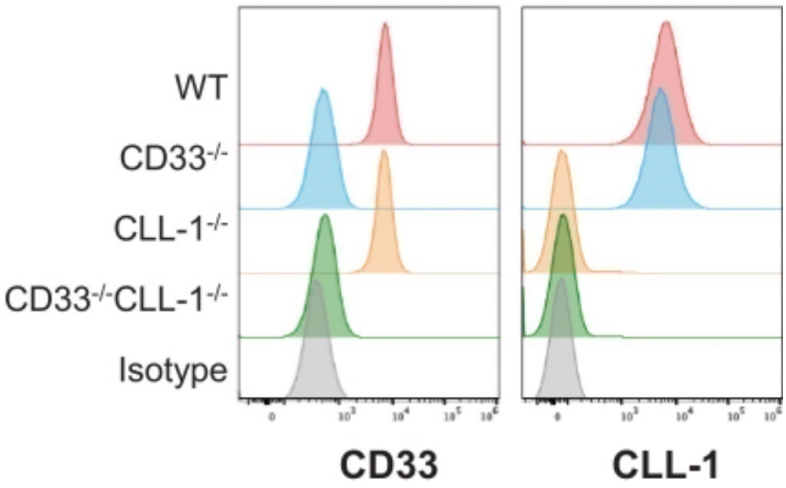
Reduction in translocation frequency with multiplex-engineering techniques



Si: Simultaneous electroporation; Se: Sequential electroporation; A and B represent undisclosed gene targets

We generated engineered AML cell lines using our multiplex-engineering approach in which both CD33 and CLL-1 surface targets were removed. As shown in the figure below, we created HL-60 cell lines from which either CD33 or CLL-1 or both CD33 and CLL-1 had been removed using CRISPR-Cas9 technology. We then used flow cytometric detection of the loss of these surface proteins from the various engineered cell lines and compared them to the WT cell line and isotype controls. The WT cell line showed high expression of both CD33 and CLL-1, whereas the CD33-/- line lacked CD33 expression while expressing high levels of CLL-1, the CLL-/- line lacked CLL-1 expression while expressing CD33 and the CD33-/-CLL-1-/- cell line lacked expression of both proteins. In each instance, the lack of expression was comparable to the isotypes that were used as controls for the lack of protein expression.

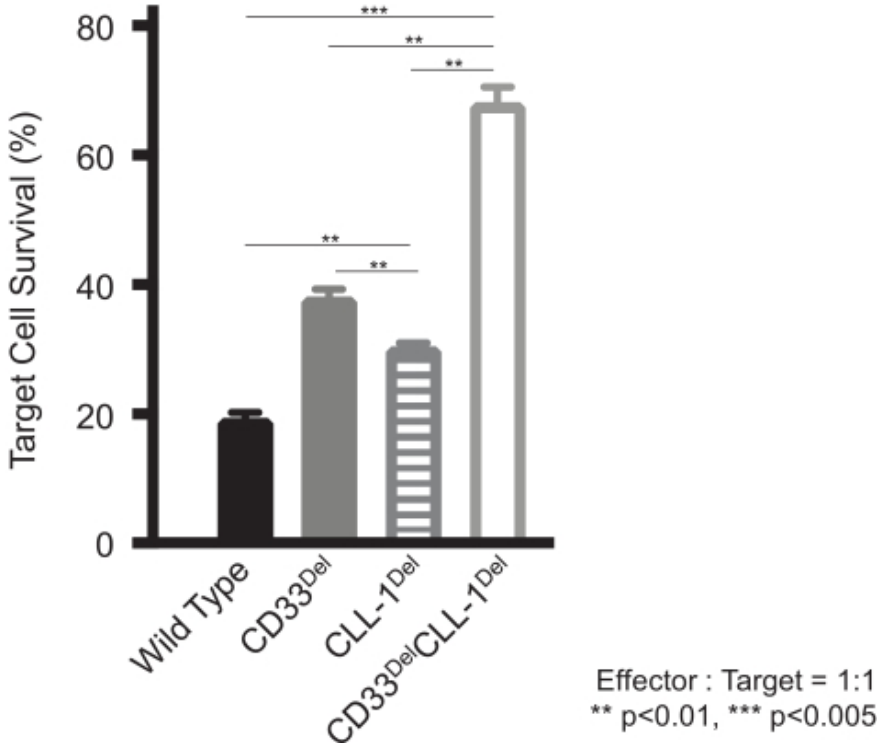
Expression of CD33 and CLL-1 in Single or Multiplexed Engineered Cells



In preclinical studies, we observed that the WT cell lines were differentiated from the multiplex engineered cell lines in the extent to which they exhibited impact from target specific treatments. As shown in the figure below, we compared the survival of WT, CD33^{Del}, CLL-1^{Del} and CD33^{Del}+CLL-1^{Del} cell lines when simultaneously exposed

to CD33 and CLL-1 CAR-T treatments *in vitro*. We observed statistically significant higher survival for cell lines with protein removals corresponding to the CAR-T targets, with the highest survival in the cell line lacking both CD33 and CLL-1 surface targets. These results suggest that the removal of these surface targets provided protection of the cell lines from the target-specific effects of the CAR-T therapy.

Survival of CD33^{Del} and CLL-1^{Del} cells after exposure to anti-CD33 and anti-CLL-1 CAR-T therapies



Commercial Strategy and Reimbursement Framework for Our eHSCs and CAR-T Product Candidate

Our goal is to maximize the reach of our therapies, if approved, to all patients in the transplant setting suffering from hematological malignancies. Each year, approximately 42,500 new cases of AML are diagnosed across the United States (~20,000), Europe (~18,000) and Japan (~4,500). For the past 20 years, there has been an increasing trend in allogeneic transplants for AML. Currently, there are approximately 12,000 allogeneic HSCTs performed globally each year, with approximately 3,500 performed in the United States, 7,000 in Europe and 1,500 in Japan.

We believe we will be able to commercialize our eHSCs, if approved, with a focused footprint where we can leverage the existing logistical infrastructure of the NMDP and HSC transplants centers. HSCTs are performed at tertiary medical care hospitals with specialized HSC transplant centers. The United States, EU5 and Japan have approximately 200, 300 and 185 transplant centers, respectively. The transplant volumes are further concentrated with 15%, or approximately 30 U.S. transplant centers, performing 50% of U.S. transplants. Building on a concentrated network of transplant centers, we have the added advantage of a rapid manufacturing process of 7-10 days. This turn-around time for collecting cells and shipping is a critical component of a successful commercialization.

We believe multiple reimbursement pathways may be available in the United States to capture the value of eHSCs and companion therapeutics, such as CAR-T. Effective for cost reporting periods beginning on or after October 1, 2020, under the Hospital Inpatient Prospective Payment System ("IPPS"), Medicare payment for HSCT will include a carve-out for the actual cost of stem cell acquisition and processing, and payment will instead be made on a reasonable cost basis. We believe this new rule may apply to innovative sources of donor stem cells like eHSCs. In addition, effective January 1, 2021, a new Medicare Severity Diagnosis-Related Group ("MS-DRG") establishes a base payment rate of approximately $240,000 for CAR-T cases, with a base rate for clinical trial cases of approximately $41,000.

A potential alternative reimbursement pathway for either eHSC or CAR-T is Medicare New Technology Add-on Payment ("NTAP") which, if approved, allows for temporary reimbursement for new cell therapies above the standard MS-DRG payment threshold. When certain criteria are met, the Centers for Medicare & Medicaid Services ("CMS"), the federal agency responsible for administering the Medicare program, may provide incremental reimbursement for up to 65% of the cost of therapy in addition to the standard MS-DRG payment. For patients covered by commercial insurance, we believe that reimbursement will be based on a case rate methodology with provisions for separate payments for new therapies such as eHSC or CAR-T. Lastly, outcomes-based agreements or value-based purchasing models is another option that is becoming more common with novel cell and gene therapies.

License Agreements

Exclusive License Agreement with Columbia University

In April 2016, we entered into an exclusive license agreement (the "Columbia Agreement") with The Trustees of Columbia University in the City of New York ("Columbia"), which agreement was subsequently amended in February 2019. Pursuant to the Columbia Agreement, we obtained a worldwide, exclusive license, with the right to grant sublicenses (subject to certain restrictions), under certain of Columbia's patents, know-how and materials to discover, develop, manufacture, have made, use, sell, offer to sell, have sold, import, export, distribute, rent or lease products that are covered by such patents or involve the use of or otherwise incorporate such know-how or materials, in each case for any and all uses. The foregoing license is subject to certain customary retained rights of Columbia, including the right to conduct academic research and publish know-how.

Under the Columbia Agreement, we are obligated to use commercially reasonable efforts to research, discover, develop and market licensed products for commercial sale and distribution, including by achieving one or more specified diligence milestones.

Under the Columbia Agreement, we paid Columbia an upfront fee of $25,000 and issued to Columbia 91,911 shares of our common stock. Under the Columbia Agreement, we are obligated to pay Columbia an annual fee in the low five digits, as well as royalties on net sales of products that are covered by the licensed patents ranging in the low single digits and on net sales of products that are not covered by the licensed patents but involve the use of or otherwise incorporate licensed know-how or materials ranging in the low single digits (which range is lower than the range for patented products), in each case with respect to such products sold by us but not our sublicensees. Royalties are payable on a patented product-by-patented product basis and country-by-country basis for such period as a valid claim covers such patented product in such country, which we expect to be until January 2040, absent any applicable patent term extensions, and, on an unpatented product-by-unpatented product and country-by-country basis for the longer of ten years from first commercial sale of such unpatented product in such country or expiration of any market exclusivity for such unpatented product in such country. If the royalty term for a patented product expires in a country and such product would otherwise qualify as an unpatented product in such country (and the applicable royalty term for such unpatented product has yet to expire in such country), then we are obligated to pay Columbia royalties for such unpatented product for the remainder of the royalty term in such country. Additionally, we are obligated to pay Columbia up to $4.45 million in the aggregate for certain clinical, regulatory and commercial milestones for the first two products and a mid-second decile percentage of consideration received from sublicensees, including royalties, provided that if such sublicensing income includes a milestone payment for which we are already obligated to make a milestone payment under the Columbia Agreement, then Columbia shall only be entitled to the higher of our milestone payment and its portion of the sublicensing income.

The Columbia Agreement expires on a country-by-country and product-by-product basis upon expiration of the applicable royalty term for such product in such country. Columbia may either terminate the Columbia Agreement or convert our license to a non-exclusive license in the case of our insolvency, or upon our uncured material breach of the agreement of certain specified provisions, including in the event that we fail to achieve one or more specified diligence milestone(s) and fail to mutually agree upon a revised plan for development of a licensed product. Additionally, we have the right to terminate the Columbia Agreement at any time upon specified written notice to Columbia.

Exclusive License Agreement with National Institutes of Health

In October 2020, we entered into a patent license agreement (the "Patent License") with the U.S. Department of Health and Human Services, as represented by National Cancer Institute ("NCI") of the NIH. Pursuant to the Patent License, we hold an exclusive, worldwide license, sublicensable with the prior written consent of NIH, to certain intellectual property rights to develop, manufacture and commercialize licensed products, or to practice licensed processes, in each case, for use in the development of a CAR therapy mono-specific for CD33 for the prophylaxis or treatment of CD33-expressing hematological malignancies (but excluding CD33-specific logic-gated CAR-based immunotherapies) wherein the CAR is comprised of the CD33-binding domain referenced as Hu195 or hP67.6, is delivered via lentiviral transduction, and the T cells are delivered autologously or allogeneically, which we collectively refer to as the field of use.

Pursuant to the terms of the Patent License, we are required to pay NCI a license issue fee in the aggregate amount of $400,000. The terms of the Patent License also require us to pay NCI de minimis minimum annual royalties, which royalties are creditable against earned royalties on sales of licensed products or licensed processes. We must also pay NCI tiered royalties on net sales of licensed products at rates ranging in the low single digits if the product CAR-T cells are delivered autologously, and at a higher range of rates in the low single digits if the product CAR-T cells are delivered allogeneically. Such royalties are payable on a licensed product-by-licensed product and country-by-country basis, commencing on the date of first commercial sale of such licensed product in such country, until the date such licensed product ceases to be covered by a valid claim of a licensed patent in such country, which we expect to occur in March 2039, absent any applicable patent term extensions, and are subject to reduction for unblocking licenses from third parties, subject to a specified royalty floor.

We are required to pay NCI one-time milestone payments upon successful completion of specified clinical and regulatory milestones relating to the licensed products. The aggregate potential milestone payments are $8.0 million. In addition, we are required to pay NCI one-time milestone payments following aggregate net sales of licensed products at certain net sales up to $2.0 billion. The aggregate potential amount of these milestone payments is $6.0 million. To the extent we enter into a sublicensing agreement relating to a licensed product, we are required to pay NCI a percentage of the non-royalty based consideration received from a sublicensee, with specified exclusions, which percentage ranges from the low single digits to low double digits, depending on the stage of development of the licensed product at the time of the sublicense. We are also required to reimburse NCI for its past patent expenses for the licensed patent rights, with such amounts being payable in three installments during the term of the Patent License, as well as our pro rata share of future patent expenses, in each case, in connection with NCI's prosecution or maintenance of the licensed patent rights. We have the right to surrender our license rights in any country and will not be required to pay NCI for patent prosecution or maintenance expenses for any licensed patents for which we exercise such right.

We are required under the Patent License to use reasonable commercial efforts to bring the licensed products and licensed processes to practical application, which includes adhering to an agreed upon commercial development plan and meeting certain performance benchmarks. We are also required, commencing upon first commercial sale of a licensed product and for the remainder of the term of the Patent License, to use reasonable commercial efforts to make licensed products and licensed processes reasonably accessible to the U.S. public.

The Patent License will expire upon expiration of the last valid claim of a licensed patent, unless terminated earlier as described below. NCI may terminate the Patent License in the event of a material breach, including if we do not use reasonable commercial efforts to execute the commercial development plan, or if we do not achieve the performance milestones by certain dates, following the expiration of a 90-day notice period during which we must

ether cure the relevant breach or initiate corrective action to NCI's reasonable satisfaction. We may terminate the Patent License, in its entirety or with respect to any license in any country, in our sole discretion at any time upon 60 days' written notice to NCI. In addition, NCI has the right to require us to grant sublicenses under the licensed patent rights in any of the fields of use under specified conditions, if required by public health or safety concerns, or to terminate or modify the Patent License if deemed necessary to meet requirements for public use as specified by federal regulations, if NCI determines that we are not reasonably satisfying such requirements.

We cannot assign the Patent License without NCI's prior written consent, other than to our affiliates. Upon NCI's approval of a proposed assignment, we must pay NCI a low-single digit percentage of the fair market value of any consideration we receive for such assignment.

Sales and Marketing

Given our stage of development, we have not yet established a commercial organization or distribution capabilities. We plan to build focused capabilities in the United States to commercialize our development programs focused on eHSCs, where we believe the patient populations and medical specialists for the indications we are targeting are sufficiently concentrated to allow us to effectively promote our products, if approved for commercial sale, with a targeted sales team. In other markets for which commercialization may be less capital efficient for us or for other development programs, such as our VCAR33 program, where the patient populations and medical specialists are less concentrated we may selectively pursue strategic collaborations with third parties in order to maximize the commercial potential of our product candidates.

Manufacturing

We do not own or operate manufacturing facilities for the production of our product candidates and the other needs of our development programs, but are planning on developing in-house manufacturing capabilities to support our currently planned clinical trials. We currently rely on third-party contract manufacturers for all of our required raw materials, manufacturing devices, active pharmaceutical ingredients and finished product for our preclinical research and expect to rely on third-party contract manufacturers for our clinical trials. We do not have long-term agreements with any of these third parties. We also do not have any current contractual relationship for the manufacture of Phase 2/3 clinical trials or commercial supplies. We intend to enter into agreements with third-party contract manufacturers and one or more backup manufacturers for future production. Although we are planning on developing certain in-house manufacturing capabilities for our current clinical needs, we continue to analyze the feasibility of building additional manufacturing capabilities for future development and commercial quantities of any products that we develop. Such products will need to be manufactured in facilities, and by processes, that comply with the requirements of the FDA and the regulatory agencies of other jurisdictions in which we are seeking approval.

Competition

The biotechnology industry is characterized by intense and dynamic competition to develop new technologies and proprietary therapies. 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. We believe that our technology platform and our scientific and clinical expertise may provide us with competitive advantages. However, we face potential competition from various sources, including larger and better-funded pharmaceutical, specialty pharmaceutical and biotechnology companies, as well as from academic institutions, governmental agencies and public and private research institutions. Prior to approval, these entities may compete with us in hiring scientific and management personnel, establishing clinical study sites, recruiting patients to participate in clinical trials and acquiring technologies complementary to, or necessary for, our programs. Furthermore, key competitive factors will affect the success of any product that may be approved by regulators, including the efficacy, safety profile, pricing, method of administration and level of promotional activity of such product.

In the case of our lead eHSC product candidate, VOR33, we are not aware of any approved products or product candidates in development that apply gene engineering technology to donor HSCs in order to reduce the on-

target toxicity of targeted cancer therapies. However, researchers at the University of Pennsylvania ("UPenn") have published the results of academic studies on gene engineering HSCs for this purpose, and UPenn has licensed intellectual property related to this approach to Tmunity Therapeutics Incorporated. We are also aware of a large number of companies that are attempting to address the problem of on-target toxicity through other treatment modalities, including many companies attempting to improve the specificity of targeted therapies, including CD33-directed targeted therapies, for AML and other hematological cancer cells. For example, Johnson & Johnson and Amgen Inc. have CD33-directed bispecific antibodies in Phase 1 clinical development, and CRISPR Therapeutics AG has released data from preclinical studies for an allogeneic CAR-T program targeting CD33. If any of these companies successfully develop effective targeted therapies for hematological malignancies without significant on-target toxicity, we believe they could compete with our eHSCs, including VOR33.

In the case of VCAR33, there are a number of companies exploring CAR-T therapies in early trials for relapsed/refractory AML. Some of these therapies are directed against targets that have approved monoclonal antibody competitors on the market already, while others have novel targets. For example, PersonGen BioTherapeutics (Suzhou) Co., Ltd. is studying a CAR-T therapy targeting tumor associated antigens, Precigen, Inc. is studying a CAR-T therapy targeting CD33 and Mustang Bio, Inc. and Cellectis S.A. are separately studying CAR-T therapies targeting CD123. Dual targeting CAR-T cell-based approaches have also recently begun clinical trials, including the ICG-144 program by iCell Gene Therapeutics, LLC and the LB1910 program from Legend Biotech Corporation, each of which target both CD33 and CLL-1.

Beyond CAR-T therapies, a number of small molecule and monoclonal antibody products have been approved in recent years for the treatment of AML, including Novartis International AG's Rydapt (midostaurin), Jazz Pharmaceuticals plc's Vyxeos (daunorubicin and cytarabine), Bristol-Myers Squibb Company's Idhifa (enasidenib), Pfizer Inc.'s Mylotarg (gemtuzumab ozogamicin) and Daurismo (glasdegib), Agios Pharmaceuticals Inc.'s Tibsovo (ivosidenib), Astella Pharma Inc.'s Xospata (gilteritinib), and AbbVie Inc.'s Venclexta (venetoclax). Other treatment modalities, such as bispecific antibodies and antibody-drug conjugates are also in development across a wide range of targets. In addition, marketed therapies are being studied in the relapsed/refractory setting, including Bristol-Myers Squibb Company's CC-486 oral formulation of azacitidine and AbbVie Inc.'s venetoclax.

Many of our current or potential competitors have substantially greater financial, technical and human resources. Accordingly, our competitors may be more successful in developing or marketing products and technologies that are more effective, safer or less costly. Additionally, our competitors may obtain regulatory approval for their products more rapidly and may achieve more widespread market acceptance. Future collaborations and mergers and acquisitions may result in further resource concentration among a smaller number of competitors. Smaller or early-stage companies may also prove to be significant competitors, either alone or through collaborative arrangements with large and established companies.

Intellectual Property

Overview

We strive to protect the proprietary product candidates and technologies that we believe are important to our business, including seeking and maintaining patent protection intended to cover the composition of matter of our product candidates, their methods of use, their methods of production, related technologies and other inventions. 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 technical know-how.

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, particularly 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 biopharmaceutical companies like us 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 protectable or remain protected 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 March 1, 2021, our owned patent portfolio is composed of approximately 37 pending U.S. and foreign patent applications, approximately 15 pending U.S. provisional patent applications, and 1 granted U.S. patent. In addition, we have licensed 5 granted U.S. patents and approximately 30 pending patent applications in the United States and foreign jurisdictions.

Patent Rights Relating to Our eHSC Programs

The patent portfolio related to our lead eHSC product candidate, VOR33, includes three patent families that are exclusively licensed from Columbia. The first patent family licensed from Columbia is directed to compositions and methods for gene engineering lineage-specific cell surface antigens, such as CD33, in HSCs and use thereof, and includes five granted U.S. patents, one pending U.S. applications and at least ten pending foreign applications in Europe, Japan, Canada, China, Australia and other countries. Any patents that grant from applications claiming priority to this patent family would be expected to expire in 2036, absent any applicable patent term extensions.

As of March 1, 2021, the second patent family licensed from Columbia, directed to compositions and methods of use of HSCs containing a single nucleotide polymorphism in CD33, includes a pending U.S. application and two pending foreign applications in Europe and Japan. Any patents that grant from applications claiming priority to this patent family would be expected to expire in 2038, absent any applicable patent term extensions.

As of March 1, 2021, the third patent family licensed from Columbia, directed to compositions and methods for gene engineering CD33 in HSCs and use thereof, includes a pending Patent Cooperation Treaty (“PCT”) patent application. Any patents that grant from applications claiming priority to this patent family would be expected to expire in 2040, absent any applicable patent term extensions.

The patent portfolio related to VOR33 also includes three patent families that we own. As of March 1, 2021, the first family, directed to compositions and methods of engineering lineage-specific antigens in HSCs includes one pending patent application in the United States and 15 pending foreign applications in Europe, Japan, Canada, China, Australia and other countries. Any patents that grant from applications claiming priority to this patent family would be expected to expire in 2038, absent any applicable patent term extensions. As of March 1, 2021, the second family, directed to compositions and methods of engineering multiple lineage-specific antigens in HSCs, includes three pending U.S. patent applications and at least 14 pending foreign patent applications. Any patents that grant from applications claiming priority to these provisional applications would be expected to expire in 2039, absent any applicable patent term extensions. As of March 1, 2021, the third family, directed to compositions and methods of treating a hematopoietic malignancy, includes a pending PCT patent application. Any patents that grant from applications claiming priority to this patent would be expected to expire in 2041, absent any applicable patent term extensions.

We also own three patent families directed to compositions and methods of engineering specific antigens in HSCs, including CD33, CLL-1 and CD123. As of March 1, 2021, the first family, directed to compositions and methods for engineering CD33 in HSCs includes a pending PCT patent application. As of March 1, 2021, the second family, directed to compositions and methods for engineering CLL-1 in HSCs includes a pending PCT patent application and one pending provisional application. As of March 1, 2021, the third family, directed to compositions and methods for engineering CD123 in HSCs includes a pending PCT patent application and one pending provisional application.

We also own seven patent families directed to compositions and methods of engineering additional target antigens in HSCs. Each of these families include at least one pending U.S. provisional patent application, and any

patents that grant from applications claiming priority to the provisional applications in these families would be expected to expire in 2041, absent any applicable patent term extensions.

Patent Rights Relating to Our Targeted Therapy Programs

We own three patent families directed to compositions and methods of making and using CARs. As of March 1, 2021, each of these families includes at least one pending U.S. provisional patent application, and any patents that grant from applications claiming priority to the provisional applications in these families would be expected to expire in 2041, absent any applicable patent term extensions.

We have one patent family that is exclusively licensed from the NIH related to our VCAR33 program. As of March 1, 2021, the patent family licensed from NCI is directed to CARs targeting CD33, compositions containing cells expressing CARs, and methods of use thereof, and includes one pending U.S. application and at least 14 pending foreign applications in Europe, Japan, Canada, China, Australia and other countries. Any patents that grant from applications claiming priority to this patent family would be expected to expire in 2039, absent any applicable patent term extensions.

We own one patent family directed to compositions and methods of using single domain antibodies targeting CD33. As of March 1, 2021, this family includes at least one pending U.S. provisional patent application, and any patents that grant from applications claiming priority to the provisional applications in these families would be expected to expire in 2041, absent any applicable patent term extensions.

Provisional Patent Applications

As indicated above, many of our owned patent applications are provisional patent applications. Provisional patent applications are not eligible to become issued patents until, among other things, we file a non-provisional patent application within 12 months of filing of one or more of our related provisional patent applications. If we do not timely file any non-provisional patent applications, we may lose our priority date with respect to our provisional patent applications and any patent protection on the inventions disclosed in our provisional patent applications. While we intend to timely file non-provisional patent applications relating to our provisional patent applications, we cannot predict whether any such patent applications will result in the issuance of patents that provide us with any competitive advantage. Moreover, the patent application and approval process is expensive and time-consuming. We may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner.

Patent Term and Term Extensions

The term of individual patents depends upon the legal term for patents in the countries in which they are obtained. In most countries in which we have filed, including the United States, the patent term is 20 years from the earliest filing date of a non-provisional patent application. In the United States, a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the U.S. Patent and Trademark Office in examining and granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier filed patent. The term of a patent that covers a drug or biological product may also be eligible for patent term extension when FDA approval is granted for a portion of the term effectively lost as a result of the FDA regulatory review period, subject to certain limitations and provided statutory and regulatory requirements are met. Any such patent term extension can be for no more than five years, only one patent per approved product can be extended, the extension cannot extend the total patent term beyond 14 years from FDA approval, and only those claims covering the approved drug, a method for using it, or a method for manufacturing it may be extended. We may not receive an extension if we fail to exercise due diligence during the testing phase or regulatory review process, fail to apply within applicable deadlines, fail to apply prior to expiration of relevant patents or otherwise fail to satisfy applicable requirements. Moreover, the length of the extension could be less than we request. In the future, if and when our product candidates receive approval from the FDA or foreign regulatory authorities, we expect to apply for patent term extensions on issued patents we may obtain in the future covering those products, depending upon the length of the clinical trials for each product and other factors. There can be no assurance that

any of our pending patent applications will issue or that we will benefit from any patent term extension or favorable adjustment to the term of any of our patents.

As with other biotechnology and pharmaceutical companies, our ability to maintain and solidify our proprietary and intellectual property position for our product candidates will depend on our success in obtaining effective patent claims and enforcing those claims if granted. However, our owned and licensed pending patent applications, and any patent applications that we may in the future file or license from third parties may not result in the issuance of patents. We also cannot predict the breadth of claims that may be allowed or enforced in our patents. Any issued patents that we may receive in the future may be challenged, invalidated, infringed or circumvented. In addition, because of the extensive time required for clinical development and regulatory review of a product candidate we may develop, it is possible that, before any of our product candidates can be commercialized, any related patent may expire or remain in force for only a short period following commercialization, thereby limiting the protection such patent would afford the respective product and any competitive advantage such patent may provide. For more information, see the section entitled “Risk Factors—Risks Related to Intellectual Property.”

Other IP Rights

In addition to patents, we rely upon unpatented trade secrets and know-how, continuing technological innovation and confidential information to develop and maintain our proprietary position and protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection, including our proprietary processes for generating and propagating eHSCs. However, trade secrets and know-how can be difficult to protect. We seek to protect our proprietary information, in part, by executing confidentiality agreements with our collaborators and scientific advisors, and non-competition, non-solicitation, confidentiality and invention assignment agreements with our employees and consultants. We have also executed agreements requiring assignment of inventions with selected scientific advisors and collaborators. The confidentiality agreements we enter into are designed to protect our proprietary information and the agreements or clauses requiring assignment of inventions to us are designed to grant us ownership of technologies that are developed through our relationship with the respective counterparty. We cannot guarantee, however, that we have executed such agreements with all applicable counterparties, such agreements will not be breached, or that these agreements will afford us adequate protection of our intellectual property and proprietary rights. In addition, our trade secrets may otherwise become known or be independently discovered by competitors. To the extent that our commercial partners, collaborators, employees and consultants use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions. For more information, see the section entitled “Risk Factors—Risks Related to Our Intellectual Property” in Part I, Item 1A of this Annual Report.

Our commercial success will also depend in part on not infringing upon the proprietary rights of third parties. It is uncertain whether the issuance of any third-party patent would require us to alter our development or commercial strategies, or our drugs or processes, obtain licenses or cease certain activities. Our breach of any license agreements or failure to obtain a license to proprietary rights that we may require to develop or commercialize our future drugs may have an adverse impact on us. Since patent applications in the United States and certain other jurisdictions are maintained in secrecy for 18 months or potentially longer, and since publication of discoveries in the scientific or patent literature often lags behind actual discoveries, we cannot be certain of the priority of inventions covered by pending patent applications.

Trademarks

We also aim to obtain and maintain registration for trademarks that we consider are relevant to our business. As of March 1, 2021, we have filed for registration of the trademarks for VOR BIOPHARMA, for VOR33, and for VOR, for international class 5 (pharmaceuticals) under the Madrid Protocol, with more than 30

applications in the United States and foreign jurisdictions. We plan to register additional trademarks in connection with any future pharmaceutical products we may commercialize, if approved.

Government Regulation and Product Approval

As a biopharmaceutical company that operates in the United States, we are subject to extensive regulation. Our cell product candidates will be regulated as biologics. With this classification, commercial production of our product candidates will need to occur in registered facilities in compliance with current good manufacturing practices ("cGMP") for biologics. The FDA categorizes human cell- or tissue-based products as either minimally manipulated or more than minimally manipulated and has determined that more than minimally manipulated products require clinical trials to demonstrate product safety and efficacy and the submission of a Biologics License Application ("BLA") for marketing authorization. Our product candidates are considered more than minimally manipulated and will require evaluation in clinical trials and the submission and approval of a BLA before we can market them.

The FDA and other government authorities in the United States (at the federal, state and local levels) and in other countries extensively regulate, among other things, the research, development, testing, manufacturing, quality control, approval, labeling, packaging, storage, record-keeping, promotion, advertising, distribution, post-approval monitoring and reporting, marketing and export and import of biopharmaceutical products such as those we are developing. Our product candidates must be approved by the FDA before they may be legally marketed in the United States and by the appropriate foreign regulatory agency before they may be legally marketed in foreign countries. Generally, our activities in other countries will be subject to regulation that is similar in nature and scope as that imposed in the United States, although there can be important differences. Additionally, some significant aspects of regulation in Europe are addressed in a centralized way, but country-specific regulation remains essential in many respects. The process for obtaining regulatory marketing approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. Product Development Process

In the United States, the FDA regulates pharmaceutical and biological products under the Federal Food, Drug and Cosmetic Act, the Public Health Service Act ("PHSA") and their implementing regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or after approval, may subject an applicant to administrative or judicial sanctions. FDA sanctions could include, among other actions, refusal to approve pending applications, withdrawal of an approval, a clinical hold, warning letters, product recalls or withdrawals from the market, product seizures, total or partial suspension of production or distribution injunctions, fines, refusals of government contracts, restitution, disgorgement or civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us. The process required by the FDA before a biological product may be marketed in the United States generally involves the following:

- completion of nonclinical laboratory tests and animal studies according to FDA's good laboratory practices ("GLPs") and applicable requirements for the humane use of laboratory animals or other applicable regulations;
- submission to the FDA of an IND application, which must become effective before human clinical trials may begin;
- approval by an independent Institutional Review Board ("IRB") or ethics committee at each clinical site before the trial is commenced;
- performance of adequate and well-controlled human clinical trials according to the FDA's regulations commonly referred to as good clinical practices ("GCPs") and any additional requirements for the

protection of human research patients and their health information, to establish the safety and efficacy of the proposed biological product for its intended use;

- submission to the FDA of a Biologics License Application ("BLA") for marketing approval that includes substantial evidence of safety, purity and potency from results of nonclinical testing and clinical trials;
- satisfactory completion of an FDA Advisory Committee review, if applicable;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the biological product is produced to assess compliance with cGMP, to assure that the facilities, methods and controls are adequate to preserve the biological product's identity, strength, quality and purity and, if applicable, the FDA's current good tissue practices ("GTPs") for the use of human cellular and tissue products;
- potential FDA audit of the nonclinical study and clinical trial sites that generated the data in support of the BLA; and
- FDA review and approval, or licensure, of the BLA to permit commercial marketing of the product for particular indications for use in the United States.

Before testing any biological product candidate, including our product candidates, in humans, the product candidate enters the preclinical testing stage. Preclinical tests, also referred to as nonclinical studies, include laboratory evaluations of product chemistry, toxicity and formulation, as well as animal studies to assess the potential safety and activity of the product candidate. The conduct of the preclinical tests must comply with federal regulations and requirements including GLPs. The clinical trial sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol, to the FDA as part of the IND. Some preclinical testing may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA raises concerns or questions regarding the proposed clinical trials and places the trial on a clinical hold within that 30-day time period. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. The FDA may also impose clinical holds on a biological product candidate at any time before or during clinical trials due to safety concerns or non-compliance. If the FDA imposes a clinical hold, trials may not recommence without FDA authorization and then only under terms authorized by the FDA. Accordingly, we cannot be sure that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues will not arise that suspend or terminate such trials.

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

Clinical trials involve the administration of the biological product candidate to human subjects under the supervision of qualified investigators, generally physicians not employed by or under the trial sponsor's control. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject selection and exclusion criteria, and the parameters to be used to monitor subject safety, including stopping rules that assure a clinical trial will be stopped if certain adverse events should occur. Each protocol and any amendments to the protocol must be submitted to the FDA as part of the IND. Clinical trials must be conducted and monitored in accordance with the FDA's regulations comprising the GCP requirements, including the requirement that all research patients provide informed consent. Further, each clinical trial must be reviewed and approved by an independent IRB at or servicing each institution at which the clinical trial will be conducted. An IRB is charged with protecting the welfare and rights of trial participants and considers such items as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits.

The IRB also approves the form and content of the informed consent that must be signed by each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed. Certain clinical trials involving human gene transfer research also must be overseen by an IBC, a standing committee established specifically to provide peer review of the safety of research plans, procedures, personnel training and environmental risks of work involving recombinant DNA molecules. IBCs are typically assigned certain review responsibilities relating to the use of recombinant DNA molecules, including reviewing potential environmental risks, assessing containment levels, and evaluating the adequacy of facilities, personnel training and compliance with the NIH Guidelines. Some studies also include oversight by an independent group of qualified experts organized by the clinical study sponsor, known as a data safety monitoring board, which provides authorization for whether or not a study may move forward at designated check points based on access to certain data from the study and may halt the clinical trial if it determines that there is an unacceptable safety risk for subjects or other grounds, such as no demonstration of efficacy. There are also requirements governing the reporting of ongoing clinical studies and clinical study results to public registries.

For purposes of BLA approval, human clinical trials are typically conducted in three sequential phases that may overlap or be combined:

- *Phase 1.* The biological product candidate is initially introduced into healthy human subjects and tested for safety. In the case of some products for severe or life-threatening diseases, especially when the product may be too inherently toxic to ethically administer to healthy volunteers, the initial human testing is often conducted in patients.
- *Phase 2.* The biological product candidate is evaluated in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product candidate for specific targeted diseases and to determine dosage tolerance, optimal dosage and dosing schedule.
- *Phase 3.* Clinical trials are undertaken to further evaluate dosage, clinical efficacy, potency and safety in an expanded patient population at geographically dispersed clinical trial sites. These clinical trials are intended to establish the overall risk to benefit ratio of the product candidate and provide an adequate basis for product labeling.

Post-approval clinical trials, sometimes referred to as Phase 4 clinical trials, may be conducted after initial marketing approval. These clinical trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication, particularly for long-term safety follow-up. These Phase 4 studies may be made a condition to approval of the BLA. During all phases of clinical development, regulatory agencies require extensive monitoring and auditing of all clinical activities, clinical data and clinical trial investigators. Annual progress reports detailing the results of the clinical trials must be submitted to the FDA. Written IND safety reports must be promptly submitted to the FDA, and the investigators for serious and unexpected adverse events, any findings from other studies, tests in laboratory animals or *in vitro* testing that suggest a significant risk for human patients, or any clinically important increase in the rate of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. The sponsor must submit an IND safety report within 15 calendar days after the sponsor determines that the information qualifies for reporting. The sponsor also must notify the FDA of any unexpected fatal or life-threatening suspected adverse reaction within seven calendar days after the sponsor's initial receipt of the information. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, if at all. The FDA or the sponsor or its data safety monitoring board may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research patients are being exposed to an unacceptable health risk, including risks inferred from other unrelated immunotherapy trials. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the biological product has been associated with unexpected serious harm to patients. In addition, some clinical trials are overseen by an independent group of qualified experts organized by the sponsor, known as a data safety monitoring board or committee. Depending on its charter, this group may determine whether a trial may move forward at designated check points based on access to certain data from the trial.

Gene therapy products are a new category of therapeutics. Because this is a relatively new and expanding area of novel therapeutic interventions, there can be no assurance as to the length of the trial period, the number of patients the FDA will require to be enrolled in the trials in order to establish the safety, efficacy, purity and potency

of gene therapy products, or that the data generated in these trials will be acceptable to the FDA to support marketing approval.

Concurrently with clinical trials, companies usually complete additional studies and must also develop additional information about the physical characteristics of the biological product candidate as well as finalize a process for manufacturing the product candidate in commercial quantities in accordance with cGMP requirements. To help reduce the risk of the introduction of adventitious agents with use of biological products, the PHSA emphasizes the importance of manufacturing control for products whose attributes cannot be precisely defined. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, the sponsor must develop methods for testing the identity, strength, quality, potency and purity of the final biological product candidate. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the biological product candidate does not undergo unacceptable deterioration over its shelf life.

U.S. Review and Approval Processes

After the completion of clinical trials of a biological product candidate, FDA approval of a BLA must be obtained before commercial marketing of the biological product. The BLA submission must include all relevant data of product development, laboratory and animal studies, human trials, information on the manufacture and composition of the product, proposed labeling and other relevant information. The testing and approval processes require substantial time and effort and there can be no assurance that the FDA will accept the BLA for filing and, even if filed, that any approval will be granted on a timely basis, if at all.

Under the Prescription Drug User Fee Act, as amended ("PDUFA"), each BLA must be accompanied by a significant user fee. The FDA adjusts the PDUFA user fees on an annual basis. PDUFA also imposes an annual program fee for biological products. Fee waivers or reductions are available in certain circumstances, including a waiver of the application fee for the first application filed by a small business. Additionally, no user fees are assessed on BLAs for products designated as orphan drugs, unless the product also includes a non-orphan indication.

Within 60 days following submission of the application, the FDA reviews a BLA submitted to determine if it is substantially complete before the agency accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review of the BLA. The FDA reviews the BLA to determine, among other things, whether the proposed product is safe, potent and/or effective for its intended use and has an acceptable purity profile, and whether the product candidate is being manufactured in accordance with cGMP to assure and preserve the product candidate's identity, safety, strength, quality, potency and purity. The FDA may refer applications for novel biological product candidates or biological product candidates that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and 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. During the biological product candidate approval process, the FDA also will determine whether a Risk Evaluation and Mitigation Strategy ("REMS") is necessary to assure the safe use of the biological product candidate. A REMS is a safety strategy to manage a known or potential serious risk associated with a medicine and to enable patients to have continued access to such medicines by managing their safe use, and could include medication guides, physician communication plans or elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. If the FDA concludes a REMS is needed, the sponsor of the BLA must submit a proposed REMS. The FDA will not approve a BLA without a REMS, if required.

Before approving a BLA, the FDA will inspect the facilities at which the product candidate is manufactured. The FDA will not approve the product candidate unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product candidate within required specifications. For immunotherapy product candidates, the FDA also will not approve the product candidate if the manufacturer is not in compliance with GTPs, to the extent applicable. These are FDA regulations

and guidance documents that govern the methods used in, and the facilities and controls used for, the manufacture of human cells, tissue and cellular and tissue based products ("HCT/Ps"), which are human cells or tissue intended for implantation, transplant, infusion or transfer into a human recipient. The primary intent of the GTP requirements is to ensure that cell and tissue based products are manufactured in a manner designed to prevent the introduction, transmission and spread of communicable disease. FDA regulations also require tissue establishments to register and list their HCT/Ps with the FDA and, when applicable, to evaluate donors through screening and testing. Additionally, before approving a BLA, the FDA will typically inspect one or more clinical sites to assure that the clinical trials were conducted in compliance with IND trial requirements and GCP requirements. To assure cGMP, GTP and GCP compliance, an applicant must incur significant expenditure of time, money and effort in the areas of training, record keeping, production and quality control.

Notwithstanding the submission of relevant data and information, the FDA may ultimately decide that the BLA does not satisfy its regulatory criteria for approval and deny approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data. If the agency decides not to approve the BLA in its present form, the FDA will issue a complete response letter that describes all of the specific deficiencies in the BLA identified by the FDA. The deficiencies identified may be minor, for example, requiring labeling changes, or major, for example, requiring additional clinical trials. Additionally, the complete response letter may include recommended actions that the applicant might take to place the application in a condition for approval. If a complete response letter is issued, the applicant may either resubmit the BLA, addressing all of the deficiencies identified in the letter, or withdraw the application.

If a product receives regulatory approval, the approval may be limited to specific diseases and dosages or the indications for use may otherwise be limited, which could restrict the commercial value of the product. Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling. The FDA may impose restrictions and conditions on product distribution, prescribing or dispensing in the form of a risk management plan, or otherwise limit the scope of any approval. In addition, the FDA may require post marketing clinical trials, sometimes referred to as Phase 4 clinical trials, designed to further assess a biological product's safety and effectiveness, and testing and surveillance programs to monitor the safety of approved products that have been commercialized.

In addition, under the Pediatric Research Equity Act ("PREA"), a BLA or supplement to a BLA must contain data 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. The FDA may grant deferrals for submission of data or full or partial waivers. Unless otherwise required by regulation, PREA does not apply to any product for an indication for which orphan designation has been granted. However, if only one indication for a product has orphan designation, a pediatric assessment may still be required for any applications to market that same product for the non-orphan indication(s).

Orphan Drug Designation

Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biologic intended to treat a rare disease or condition, which is generally a disease or condition that affects fewer than 200,000 individuals in the United States, or 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 in the United States a drug or biologic for this type of disease or condition will be recovered from sales in the United States for that drug or biologic. Orphan drug designation must be requested before submitting a BLA. After the FDA grants orphan drug designation, the generic identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA. The orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review or approval process.

If a product candidate that has orphan drug designation subsequently receives the first FDA approval for the disease for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications, including a full BLA, to market the same biologic for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity. Orphan drug exclusivity does not prevent FDA from approving a different drug or biologic for the same disease or condition, or the same drug or biologic for a different disease or condition. Among

the other benefits of orphan drug designation are tax credits for certain research and a waiver of the BLA application user fee.

A designated orphan drug may not receive orphan drug exclusivity if it is approved for a use that is broader than the indication for which it received orphan designation. In addition, exclusive marketing rights in the United States may be lost if the FDA later determines that the request for designation was materially defective, if the second applicant demonstrates that its product is clinically superior to the approved product with orphan exclusivity, or if the manufacturer is unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. Orphan drug designation may also entitle a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages and user-fee waivers.

Expedited Development and Review Programs

The FDA has established certain programs intended to expedite or facilitate the process for developing, reviewing or approving new products that meet certain criteria, including fast track designation, breakthrough therapy designation, accelerated approval and priority review. Specifically, new product candidates are eligible for fast track designation if they are intended to treat a serious or life-threatening disease or condition and demonstrate the potential to address unmet medical needs for the disease or condition. Fast track designation applies to the combination of the product candidate and the specific indication for which it is being studied. Unique to a fast track product, the FDA may consider for review sections of the BLA on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the BLA and the payment of applicable user fees, the FDA agrees to accept sections of the BLA and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the BLA.

Any product candidate submitted to the FDA for approval, including a product candidate with a fast track designation, may also be eligible for other types of FDA programs intended to expedite development and review, such as priority review and accelerated approval. A product candidate is eligible for priority review if it has the potential to provide safe and effective therapy where no satisfactory alternative therapy exists or a significant improvement in the treatment, diagnosis or prevention of a disease compared to marketed products. The FDA will attempt to direct additional resources to the evaluation of an application for a new product candidate designated for priority review in an effort to facilitate the review.

Additionally, a product candidate may be eligible for accelerated approval. Product candidates studied for their safety and effectiveness in treating serious or life-threatening diseases or conditions may receive accelerated approval upon a determination that the product candidate has an effect on a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity or prevalence of the condition and the availability or lack of alternative treatments. As a condition of approval, the FDA may require that a sponsor of a drug or biological product candidate receiving accelerated approval perform adequate and well-controlled post-marketing clinical studies. The FDA may withdraw approval of a drug or indication approved under accelerated approval if, for example, the confirmatory trial fails to verify the predicted clinical benefit of the product. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product candidate.

In addition, breakthrough therapy designation is intended to expedite the development and review of product candidates that treat serious or life-threatening conditions. The designation by FDA requires preliminary clinical evidence that a product candidate, alone or in combination with other drugs and biologics, demonstrates substantial improvement over currently available therapy on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. If the FDA designates a breakthrough therapy, it may take actions appropriate to expedite the development and review of the application, which may include holding meetings with the sponsor and the review team throughout the development of the therapy; providing timely advice to, and interactive communication with, the sponsor regarding the development of the drug to ensure that the development program to gather the nonclinical and clinical data necessary for approval is as efficient as practicable; involving senior managers and experienced review staff, as appropriate, in a collaborative, cross-disciplinary review; assigning

a cross-disciplinary project lead for the FDA review team to facilitate an efficient review of the development program and to serve as a scientific liaison between the review team and the sponsor; and considering alternative clinical trial designs when scientifically appropriate, which may result in smaller trials or more efficient trials that require less time to complete and may minimize the number of patients exposed to a potentially less efficacious treatment. Breakthrough therapy designation comes with all of the benefits of fast track designation, which means that the sponsor may file sections of the BLA for review on a rolling basis if certain conditions are satisfied, including an agreement with FDA on the proposed schedule for submission of portions of the application and the payment of applicable user fees before the FDA may initiate a review. The breakthrough therapy designation is a distinct status from both accelerated approval and priority review, which can also be granted to the same product candidate if relevant criteria are met. If a product candidate is designated as breakthrough therapy, FDA will expedite the development and review of such product candidate.

Fast Track designation, priority review, accelerated approval, and breakthrough therapy designation do not change the standards for approval but may expedite the development or approval process. Even if a product qualifies for one or more of these programs, the FDA may later decide that the product no longer meets the conditions for qualification or that the time period for FDA review and approval will not be shortened.

Post-Approval Requirements

Any products for which we receive FDA approvals are subject to continuing regulation by the FDA, including, among other things, continuing user fee requirements, record-keeping requirements, reporting of adverse experiences with the product, providing the FDA with updated safety and efficacy information, product sampling and distribution requirements, and complying with FDA promotion and advertising requirements, which include, among others, standards for direct-to-consumer advertising, restrictions on promoting products for uses or in patient populations that are not described in the product's approved uses (known as "off-label use"), limitations on industry-sponsored scientific and educational activities, and requirements for promotional activities involving the internet. Although a physician may prescribe a legally available product for an off-label use, if the physicians deems such product to be appropriate in his/her professional medical judgment, a manufacturer may not market or promote off-label uses. However, companies may share truthful and not misleading information that is otherwise consistent with a product's FDA-approved labeling. A company that is found to have promoted off-label use of its product may be subject to significant liability, including administrative, civil and criminal sanctions.

In addition, quality control and manufacturing procedures must continue to conform to applicable manufacturing requirements after approval to ensure the long-term stability of the product. cGMP regulations require among other things, quality control and quality assurance as well as the corresponding maintenance of records and documentation and the obligation to investigate and correct any deviations from cGMP. Manufacturers and other entities involved in the manufacture and distribution of approved products are required to register their establishments with the FDA and certain state agencies and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP and other laws. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain cGMP compliance. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer or holder of an approved BLA, including, among other things, recall or withdrawal of the product from the market. In addition, changes to the manufacturing process are strictly regulated and, depending on the significance of the change, may require prior FDA approval before being implemented. Other types of changes to the approved product, such as adding new indications and claims, are also subject to further FDA review and approval.

The FDA also may require post-marketing testing, known as Phase 4 testing, and surveillance to monitor the effects of an approved product. Discovery of previously unknown problems with a product or the failure to comply with applicable FDA requirements can have negative consequences, including adverse publicity, judicial or administrative enforcement, warning letters from the FDA, mandated corrective advertising or communications with doctors, and civil or criminal penalties, among others. Newly discovered or developed safety or effectiveness data may require changes to a product's approved labeling, including the addition of new warnings and contraindications, and also may require the implementation of other risk management measures. Also, new government requirements,

including those resulting from new legislation, may be established, or the FDA's policies may change, which could delay or prevent regulatory approval of our products under development.

The FDA may withdraw approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with manufacturing processes, or failure to comply with regulatory requirements, may result in revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical studies to assess new safety risks; or imposition of distribution restrictions or other restrictions under a REMS program. Other potential consequences include, among other things:

- restrictions on the marketing or manufacturing of a product, complete withdrawal of the product from the market or product recalls;
- fines, warning letters or holds on post-approval clinical studies;
- refusal of the FDA to approve pending applications or supplements to approved applications, or suspension or revocation of existing product approvals;
- product seizure or detention, or refusal of the FDA to permit the import or export of products;
- consent decrees, corporate integrity agreements, debarment or exclusion from federal healthcare programs;
- mandated modification of promotional materials and labeling and the issuance of corrective information;
- the issuance of safety alerts, Dear Healthcare Provider letters, press releases and other communications containing warnings or other safety information about the product; or
- injunctions or the imposition of civil or criminal penalties.

U.S. Marketing Exclusivity

The Biologics Price Competition and Innovation Act ("BPCIA") amended the PHSA to authorize the FDA to approve similar versions of innovative biologics, commonly known as biosimilars. A competitor seeking approval of a biosimilar must file an application to establish its molecule as highly similar to an approved innovator biologic, among other requirements.

Biosimilarity, which requires that there be no clinically meaningful differences between the biological product and the reference product in terms of safety, purity, and potency, can be shown through analytical studies, animal studies, and a clinical study or studies. Interchangeability requires that a product is biosimilar to the reference product and the product must demonstrate that it can be expected to produce the same clinical results as the reference product in any given patient and, for products that are administered multiple times to an individual, the biologic and the reference biologic may be alternated or switched after one has been previously administered without increasing safety risks or risks of diminished efficacy relative to exclusive use of the reference biologic. Complexities associated with the larger, and often more complex, structures of biological products, as well as the processes by which such products are manufactured, pose significant hurdles to implementation of the abbreviated approval pathway that are still being worked out by the FDA.

Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date that the reference product was first licensed by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first licensed. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing that applicant's own preclinical data and data from adequate and well controlled clinical trials to demonstrate the safety, purity and potency of its product. The BPCIA also created certain exclusivity periods for biosimilars approved as interchangeable products. At this juncture, it is unclear whether products deemed "interchangeable" by the FDA will, in fact, be readily substituted by pharmacies, which are governed by state pharmacy law.

The BPCIA is complex and continues to be interpreted and implemented by the FDA. In addition, recent government proposals have sought to reduce the 12-year reference product exclusivity period. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. As a result, the ultimate impact, implementation, and impact of the BPCIA is subject to significant uncertainty.

Pediatric exclusivity is another type of regulatory market exclusivity in the United States. Pediatric exclusivity, if granted, adds six months to existing exclusivity periods and patent terms. This six-month exclusivity, which runs from the end of other exclusivity protection or patent term, may be granted based on the voluntary completion of a pediatric trial in accordance with an FDA-issued "Written Request" for such a trial.

Other U.S. Healthcare Laws and Compliance Requirements

In the United States, our activities are potentially subject to regulation by various federal, state and local authorities in addition to the FDA, including but not limited to, the CMS, other divisions of the U.S. Department of Health and Human Services (e.g., the Office of Inspector General), the U.S. Department of Justice ("DOJ") and individual U.S. Attorney offices within the DOJ, and state and local governments. For example, our business practices, including our clinical research and any future sales, marketing and scientific/educational grant programs may be required to comply with the fraud and abuse provisions of the Social Security Act, the false claims laws, the data privacy and security provisions of the Health Insurance Portability and Accountability Act ("HIPAA"), federal transparency requirements and similar state laws, each as amended.

The federal Anti-Kickback Statute prohibits, among other things, any person or entity, from knowingly and willfully offering, paying, soliciting or receiving any remuneration (including any kickback, bribe or rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce or in return for, either the referral of an individual for, or the purchasing, leasing, ordering or arranging for the purchase, lease or order of any item or service reimbursable under Medicare, Medicaid or other federal healthcare programs. The term remuneration has been interpreted broadly to include anything of value. The federal Anti-Kickback Statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on one hand and prescribers, purchasers and formulary managers on the other. There are a number of statutory exceptions and regulatory safe harbors protecting some common activities from prosecution. The exceptions and safe harbors are drawn narrowly and require strict compliance in order to offer protection. Practices that involve remuneration that may be alleged to be intended to induce prescribing, purchasing or recommending may be subject to scrutiny if they do not qualify for an exception or safe harbor. Failure to meet all of the requirements of a particular applicable statutory exception or regulatory safe harbor does not make the conduct per se illegal under the Anti-Kickback Statute. Instead, the legality of the arrangement will be evaluated on a case-by-case basis based on a cumulative review of all of its facts and circumstances. In addition, a person or entity does not need to have actual knowledge of the federal Anti-Kickback Statute or specific intent to violate it in order to have committed a violation. Rather, if "one purpose" of the remuneration is to induce referrals, the federal Anti-Kickback Statute is violated.

The federal civil monetary penalties statute imposes penalties against any person or entity who, among other things, is determined to have knowingly presented or caused to be presented a false or fraudulent claim to, among others, a federal healthcare program that the person knows or should know is for an item or service that was not provided as claimed or is false or fraudulent.

The federal civil False Claims Act prohibits, among other things, any person or entity from knowingly presenting, or causing to be presented, a false claim for payment to, or approval by, the federal government or knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim to the federal government in order to avoid, decrease or conceal an obligation to pay money to the federal government. As a result of a modification made by the Fraud Enforcement and Recovery Act of 2009, a claim includes "any request or demand" for money or property presented to the federal government. The federal civil False Claims Act can be enforced through private "qui tam" actions brought by individual whistleblowers in the name of the government. In addition, manufacturers can be held liable under the civil False Claims Act even when they do

not submit claims directly to government payors if they are deemed to "cause" the submission of false or fraudulent claims. Pharmaceutical and other healthcare companies are being investigated or, in the past, have been prosecuted under these laws for, among other things, allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. In addition, pharmaceutical and other healthcare companies also have been prosecuted for causing false claims to be submitted because of the companies' marketing of the product for unapproved, and thus non-reimbursable, uses and purportedly concealing price concessions in the pricing information submitted to the government for government priced reporting purposes. A claim that includes items or services resulting from a violation of the federal Anti-Kickback Statute also constitutes a false or fraudulent claim for purposes of the federal civil False Claims Act.

HIPAA created additional federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme or artifice to defraud or to obtain, by means of false or fraudulent pretenses, representations or promises, any money or property owned by, or under the control or custody of, any healthcare benefit program, including private third-party payors and knowingly and willfully falsifying, concealing or covering up by trick, scheme or device, 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. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.

We may be subject to data privacy and security regulations by both the federal government and the states in which we conduct our business. HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 and its implementing regulations (which we collectively refer to as HIPAA), imposes requirements on certain types of individuals and entities, including covered entities (i.e., certain healthcare providers, health plans and healthcare clearinghouses), as well as their business associates that perform certain services on behalf of the covered entities and their covered subcontractors, relating to the privacy, security and transmission of individually identifiable health information. Entities that are found to be in violation of HIPAA as the result of a breach of unsecured protected health information, a complaint about privacy practices or an audit by HHS, may be subject to significant civil, criminal and administrative fines and penalties and/or additional reporting and oversight obligations if required to enter into a resolution agreement and corrective action plan with HHS to settle allegations of HIPAA non-compliance. Further, entities that knowingly obtain, use, or disclose individually identifiable health information maintained by a HIPAA covered entity in a manner that is not authorized or permitted by HIPAA may be subject to criminal penalties. In addition, state laws govern the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

Additionally, the federal Physician Payments Sunshine Act created under the Affordable Care Act, and its implementing regulations, require that certain manufacturers of drugs, devices, biological and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) annually report information to CMS related to certain payments or other transfers of value made or distributed to physicians (currently defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, or to entities or individuals at the request of, or designated on behalf of, the physicians and teaching hospitals and to report annually certain ownership and investment interests held by physicians and their immediate family members. Effective January 1, 2022, applicable manufacturers will also be required to report information regarding payments and other transfers of value provided during the previous year to physician assistants, nurse practitioners, clinical nurse specialists, anesthesiologist assistants, certified nurse anesthetists and certified nurse-midwives.

Also, many states have similar fraud and abuse statutes or regulations similar to the aforementioned federal laws that apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor. In order to distribute products commercially, we must comply with state laws that require the registration of manufacturers and wholesale distributors of drug and biological products in a state, including, in certain states, manufacturers and distributors who ship products into the state even if such manufacturers or distributors have no place of business within the state. Some states also impose requirements on manufacturers and distributors to establish the pedigree of product in the chain of distribution, including some states that require manufacturers and others to adopt new technology capable of tracking and tracing product as it moves

through the distribution chain. Several states and local jurisdictions have enacted legislation requiring pharmaceutical and biotechnology companies to establish marketing compliance programs and comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government, file periodic reports with the state, make periodic public disclosures on sales, marketing, pricing, clinical trials and other activities, and/or register their sales representatives, as well as to prohibit pharmacies and other healthcare entities from providing certain physician prescribing data to pharmaceutical and biotechnology companies for use in sales and marketing, and to prohibit certain other sales and marketing practices. All of our activities are also potentially subject to federal and state consumer protection and unfair competition laws.

If our operations are found to be in violation of any of the federal and state healthcare laws described above or any other governmental regulations that apply to us, we may be subject to significant penalties, including without limitation, civil, criminal and/or administrative penalties, damages, fines, disgorgement, imprisonment, exclusion from participation in government programs, such as Medicare and Medicaid, injunctions, contractual damages, reputational harm, administrative burdens, diminished profits and future earnings, additional reporting requirements and/or oversight if we become subject to a corporate integrity agreement 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.

Coverage, Pricing and Reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any product candidates for which we obtain regulatory approval. In the United States and certain markets in other countries, sales of any products for which we receive regulatory approval for commercial sale will depend, in part, on the extent to which third-party payors provide coverage and establish adequate reimbursement levels for such products. No uniform policy for coverage and reimbursement exists in the United States, and coverage and reimbursement can differ significantly from payor to payor. As a result, the coverage determination process is often time-consuming and costly. In the United States, third-party payors include federal and state healthcare programs, private managed care providers, health insurers and other organizations. The process for determining whether a third-party payor will provide coverage for a product may be separate from the process for setting the price of a product or from establishing the reimbursement rate that such a payor will pay for the product. Third-party payors may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the FDA-approved products for a particular indication.

Third-party payors are increasingly challenging the price, examining the medical necessity and reviewing the cost-effectiveness of medical products, therapies and services, in addition to questioning their safety and efficacy. New metrics frequently are used as the basis for reimbursement rates, such as average sales price, average manufacturer price and actual acquisition cost. We may need to conduct expensive pharmaco-economic studies in order to demonstrate the medical necessity and cost-effectiveness of our products, in addition to the costs required to obtain the FDA approvals. Our product candidates may not be considered medically necessary or cost-effective. A payor's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Further, one payor's determination to provide coverage for a product does not assure that other payors will also provide coverage for the product. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development. We cannot predict at this time what third-party payors will decide with respect to the coverage and reimbursement for our product candidates including, for example, whether we will seek, and whether CMS would approve, an NTAP under the IPPS for our product candidates, once approved. NTAP will only be available for our products if we submit a timely and complete application and CMS determines that our product candidates meet the eligibility requirements of NTAP, including, among other criteria, demonstrating a substantial clinical improvement relative to services or technologies previously available.

Additionally, the containment of healthcare costs has become a priority of federal and state governments, and the prices of drugs have been a focus in this effort. The United States government, state legislatures and foreign 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 our net revenue and results.

Different pricing and reimbursement schemes exist in other countries. In the EU, governments influence the price of pharmaceutical products through their pricing and reimbursement rules and control of national health care systems that fund a large part of the cost of those products to consumers. Some jurisdictions operate positive and negative list systems under which products may only be marketed once a reimbursement price has been agreed. To obtain reimbursement or pricing approval, some of these countries may require the completion of clinical trials that compare the cost-effectiveness of a particular product candidate to currently available therapies. Other member states allow companies to fix their own prices for medicines, but monitor and control company profits. The downward pressure on health care costs has become very intense. As a result, increasingly high barriers are being erected to the entry of new products. In addition, in some countries, cross-border imports from low-priced markets exert a commercial pressure on pricing within a country. Accordingly, in markets outside the United States, the reimbursement for our products may be reduced compared with the United States and may be insufficient to generate commercially reasonable revenue and profits.

The marketability of any product candidates for which we receive regulatory approval for commercial sale may suffer if the government and third-party payors fail to provide coverage and adequate reimbursement. In addition, emphasis on managed care in the United States has increased and we expect will continue to increase the pressure on healthcare pricing. Coverage policies and third-party reimbursement rates may change at any time. These and other actions by federal and state governments and health plans may put additional downward pressure on pharmaceutical pricing and health care costs, which could negatively impact coverage and reimbursement for our products if approved, our revenue, and our ability to compete with other marketed products and to recoup the costs of our research and development. Even if favorable coverage and reimbursement status is attained for one or more products for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Healthcare Reform

In the United States and some foreign jurisdictions, there have been, and continue to be, several legislative and regulatory changes and proposed changes regarding the healthcare system that could prevent or delay marketing approval of product candidates, restrict or regulate post-approval activities and affect the ability to profitably sell product candidates for which marketing approval is obtained. Among policy makers and payors in the United States and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality and/or expanding access. In the United States, the pharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives.

For example, the Affordable Care Act has substantially changed healthcare financing and delivery by both governmental and private insurers. Among the Affordable Care Act provisions of importance to the pharmaceutical and biotechnology industries, in addition to those otherwise described above, are the following:

- an annual, nondeductible fee on any entity that manufactures or imports certain specified branded prescription drugs and biologic agents apportioned among these entities according to their market share in some government healthcare programs;
- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program, to 23.1% and 13% of the average manufacturer price for most branded and generic drugs, respectively, and capped the total rebate amount for innovator drugs at 100% of the Average Manufacturer Price;
- a new Medicare Part D coverage gap discount program, in which manufacturers must now agree to offer 70% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturers' outpatient drugs to be covered under Medicare Part D;

- extension of manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;
- expansion of eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals and by adding new mandatory eligibility categories for individuals with income at or below 133% of the federal poverty level, thereby potentially increasing manufacturers' Medicaid rebate liability;
- expansion of the entities eligible for discounts under the 340B Drug Discount Program;
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in and conduct comparative clinical effectiveness research, along with funding for such research;
- expansion of healthcare fraud and abuse laws, including the False Claims Act and the Anti-Kickback Statute, new government investigative powers and enhanced penalties for noncompliance;
- a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected;
- requirements to report certain financial arrangements with physicians and teaching hospitals;
- a requirement to annually report certain information regarding drug samples that manufacturers and distributors provide to physicians;
- establishment of a Center for Medicare and Medicaid Innovation at CMS to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending; and
- creation of a licensure framework for follow on biologic products.

There have been executive, legal and political challenges to certain aspects of the Affordable Care Act. For example, in December 2017, Congress repealed the tax penalty for an individual's failure to maintain Affordable Care Act-mandated health insurance as part of the Tax Cuts and Jobs Act of 2017 (the "Tax Act"), effective January 1, 2019. In addition, the 2020 federal spending package permanently eliminated, effective January 1, 2020, the ACA-mandated "Cadillac" tax on high-cost employer-sponsored health coverage and medical device tax and, effective January 1, 2021, also eliminated the health insurer tax. On December 14, 2018, a Texas United States District Court Judge ruled that the Affordable Care Act is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Additionally, on December 18, 2019, the U.S. Court of Appeals for the 5th Circuit upheld the District Court ruling that the individual mandate was unconstitutional and remanded the case back to the District Court to determine whether the remaining provisions of the Affordable Care Act are invalid as well. On March 2, 2020, the U.S. Supreme Court granted the petitions for writs of certiorari to review this case, and held oral arguments on November 10, 2020. The U.S. Supreme Court is currently reviewing the case, and it is unclear how or when the Supreme Court will rule. Although the U.S. Supreme Court has not yet ruled on the constitutionality of the ACA, on January 28, 2021, President Biden issued an executive order to initiate a special enrollment period from February 15, 2021 through May 15, 2021 for purposes of obtaining health insurance coverage through the ACA marketplace. The executive order also instructs certain governmental agencies to review and reconsider their existing policies and rules that limit access to healthcare, including among others, reexamining Medicaid demonstration projects and waiver programs that include work requirements, and policies that create unnecessary barriers to obtaining access to health insurance coverage through Medicaid or the ACA. It is unclear how the Supreme Court ruling, other such litigation, and the healthcare reform measures of the Biden administration will impact the ACA and our business.

We anticipate that the Affordable Care Act, if substantially maintained in its current form, will continue to result in additional downward pressure on coverage and the price that we receive for any approved product and could seriously harm our business. Any reduction in reimbursement from Medicare and other government programs may result in a similar reduction in payments from private payors. The implementation of cost containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain profitability or commercialize our products. Such reforms could have an adverse effect on anticipated revenue from product

candidates that we may successfully develop and for which we may obtain regulatory approval and may affect our overall financial condition and ability to develop product candidates.

Further legislation or regulation could be passed that could harm our business, financial condition and results of operations. Other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. For example, in August 2011, the Budget Control Act of 2011 was signed into law, which, among other things, included aggregate reductions to Medicare payments to providers of 2% per fiscal year and, due to subsequent legislative amendments to the statute, will stay in effect through 2030, with the exception of a temporary suspension from May 1, 2020 through March 31, 2021, unless additional Congressional action is taken. Further, in January 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several types of providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

Additionally, there has been increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. Specifically, there have been several recent U.S. Congressional inquiries and proposed and enacted federal legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. At the federal level, the Trump administration used several means to propose or implement drug pricing reform, including through federal budget proposals, executive orders and policy initiatives. For example, on July 24, 2020 and September 13, 2020, the Trump administration announced several executive orders related to prescription drug pricing that attempted to implement several of the administration's proposals. As a result, the FDA released a final rule on September 24, 2020, effective November 30, 2020, providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020, HHS finalized a regulation removing safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The implementation of the rule has been delayed by the Biden administration from January 1, 2022 to January 1, 2023 in response to ongoing litigation. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers, the implementation of which have also been delayed pending review by the Biden administration until March 22, 2021. On November 20, 2020, CMS issued an interim final rule implementing a Most Favored Nation executive order, which would tie Medicare Part B payments for certain physician-administered drugs to the lowest price paid in other economically advanced countries, effective January 1, 2021. On December 28, 2020, the United States District Court in Northern California issued a nationwide preliminary injunction against implementation of the interim final rule. It is unclear whether the Biden administration will work to reverse these measures or pursue similar policy initiatives. Individual states in the United States have also become increasingly active 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.

Further, it is possible that additional governmental action is taken in response to the COVID-19 pandemic.

The Foreign Corrupt Practices Act

The Foreign Corrupt Practices Act ("FCPA") prohibits any U.S. individual or business from paying, offering or 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 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.

Additional Regulation

In addition to the foregoing, state and federal laws regarding environmental protection and hazardous substances, including the Occupational Safety and Health Act, the Resource Conservancy and Recovery Act and the Toxic Substances Control Act, affect our business. These and other laws govern our use, handling and disposal of various biological, chemical and radioactive substances used in, and wastes generated by, our operations. If our operations result in contamination of the environment or expose individuals to hazardous substances, we could be liable for damages and governmental fines. We believe that we are in material compliance with applicable environmental laws and that continued compliance therewith will not have a material adverse effect on our business. We cannot predict, however, how changes in these laws may affect our future operations.

Europe/Rest of World Government Regulation

In addition to regulations in the United States, we will be subject to a variety of regulations in other jurisdictions governing, among other things, clinical trials and any commercial sales and distribution of our products. Whether or not we obtain FDA approval of a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical trials or marketing of the product in those countries. Certain countries outside of the United States have a similar process that requires the submission of a clinical trial application much like the IND prior to the commencement of human clinical trials. In the EU, for example, a clinical trial application must be submitted to each country's national health authority and an independent ethics committee, much like the FDA and IRB, respectively. Once the clinical trial application is approved in accordance with a country's requirements, clinical trial development may proceed. Because biologically sourced raw materials are subject to unique contamination risks, their use may be restricted in some countries.

The requirements and process governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, the clinical trials must be conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

To obtain regulatory approval of an investigational drug or biological product under EU regulatory systems, we must submit a Marketing Authorisation Application. The application used to file the BLA in the United States is similar to that required in the EU, with the exception of, among other things, country-specific document requirements.

For other countries outside of the EU, such as countries in Eastern Europe, Latin America or Asia, the requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, again, the clinical trials must be conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

If we or our potential collaborators fail to comply with applicable foreign regulatory requirements, we may be subject to, among other things, fines, suspension or withdrawal of regulatory approvals, product recalls, seizure of products, operating restrictions and criminal prosecution.

Employees and Human Capital Resources

Our human capital is integral to helping us achieve our mission of developing transformative treatments for patients suffering from hematological malignancies. We have built a culture of high performance based on our core values:

- *Passion:* enthusiastically driving our science toward innovative medicines.
- *Fellowship*: fostering genuine bonds of collaboration and mentorship.
- *Humility:* acting selflessly by putting the collective mission first.

Our human capital 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.

As of March 1, 2021, we had 88 full-time employees, 33 of whom held an M.D. or Ph.D. degree and 62 of whom are engaged in research and development activities. None of our employees are represented by a labor union or covered by a collective bargaining agreement. We consider our relationship with our employees to be good.

Corporate Information

Our principal executive offices are located at 100 Cambridgepark Drive, Suite 400, Cambridge, Massachusetts 02140 and our telephone number is 617-655-6580.

Available Information

We maintain an internet website at www.vorbio.com and make available free of charge through our website our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports filed or furnished pursuant to Sections 13(a) and 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). We make these reports available through our website as soon as reasonably practicable after we electronically file such reports with, or furnish such reports to, the Securities and Exchange Commission (the "SEC"). You can review our electronically filed reports and other information that we file with the SEC on the SEC's web site at http://www.sec.gov. We also make available, free of charge on our website, the reports filed with the SEC by our executive officers, directors and 10% stockholders pursuant to Section 16 under the Exchange Act as soon as reasonably practicable after copies of those filings are provided to us by those persons. In addition, we regularly use our website to post information regarding our business, product development programs and governance, and we encourage investors to use our website, particularly the information in the section entitled "Investors," as a source of information about us.

The information on our website is not incorporated by reference into this Annual Report and should not be considered to be a part of this Annual Report. Our website address is included in this Annual Report as an inactive technical reference only.

Investors and others should note that we announce material information to our investors using one or more of the following: SEC filings, press releases and our corporate website, including without limitation the "Investors" and "Events and Presentations" sections of our website. We use these channels, as well as social media channels such as LinkedIn, in order to achieve broad, non-exclusionary distribution of information to the public and for complying with our disclosure obligations under Regulation FD. It is possible that the information we post on our corporate website or other social media could be deemed to be material information. Therefore, we encourage investors, the media, and others interested in our company to review the information we post on the "Investors" and "Events and Presentations" sections of our corporate website and on our social media channels. The contents of our corporate website and social media channels are not, however, a part of this Annual Report.

Item 1A. Risk Factors.

The following risk factors and other information included in this Annual Report on Form 10-K ("Annual Report"), including our financial statements and related notes thereto, should be carefully considered. The risks and uncertainties described below are not the only risks and uncertainties we face. Additional risks and uncertainties not presently known to us or that we presently deem less significant may also impair our business operations. Please see review the discussion regarding some of the forward-looking statements that are qualified by these risk factors contained elsewhere in this Annual Report. If any of the following risks occur, our business, financial condition, results of operations and future growth prospects could be materially and adversely affected. Such risks may be amplified by the COVID-19 pandemic and its potential impact on our business and the global economy.

Risks Related to Our Financial Position and Need for Additional Capital

We have incurred significant net losses since inception. We expect to incur net losses for the foreseeable future and may never achieve or maintain profitability.

Since inception, we have not generated any revenue and have incurred significant operating losses. For the years ended December 31, 2020 and 2019, our net loss was $43.3 million and $10.8 million, respectively. As of December 31, 2020, we had an accumulated deficit of $61.2 million. We have financed our operations primarily through a public offering of our common stock and private placements of our preferred stock. We have devoted all of our efforts to organizing and staffing our company, business and scientific planning, raising capital, acquiring and developing technology, identifying potential product candidates, undertaking research and preclinical studies of potential product candidates, developing manufacturing capabilities and evaluating a clinical path for our pipeline programs. We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. The net losses we incur may fluctuate significantly from quarter to quarter. We anticipate that our expenses will increase substantially if and as we:

- initiate and complete the Phase 1/2a clinical trial for our product candidate VOR33;
- initiate clinical development of VOR33 in combination or in sequence with VCAR33 as a companion therapeutic, which we refer to as the VOR33/VCAR33 Treatment System;
- continue our current research programs and development of other potential product candidates from our current research programs;
- seek to identify additional product candidates and research programs;
- initiate preclinical testing and clinical trials for any other product candidates we identify and develop;
- maintain, expand, enforce, defend and protect our intellectual property portfolio and provide reimbursement of third-party expenses related to our patent portfolio;
- develop, acquire or in-license additional targeted therapies that could potentially be used in combination or sequence with VOR33 or other engineered hematopoietic stem cell ("eHSC") product candidates we may develop;
- seek marketing approvals for any product candidates that successfully complete clinical trials;
- ultimately establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain marketing approval;
- adapt our regulatory compliance efforts to incorporate requirements applicable to marketed products;
- further develop our genome engineering capabilities;
- hire additional research and development and clinical personnel;
- hire commercial personnel and advance market access and reimbursement strategies;
- add operational, financial and management information systems and personnel, including personnel to support our product development;

- acquire or in-license product candidates, intellectual property and technologies;
- develop or in-license manufacturing and distribution technologies, or create and maintain our own current Good Manufacturing Practices ("cGMP") manufacturing facilities;
- should we decide to do so and receive approval for any of our product candidates, build and maintain, or purchase and validate, commercial-scale manufacturing facilities designed to comply with cGMP requirements; and
- operate as a public company.

As a company, we have not completed clinical development of any product candidate and expect that it will be several years, if ever, before we have a product candidate ready for commercialization. To become and remain profitable, we must develop and, either directly or through collaborators, eventually commercialize a product or products with significant market potential. This will require us to be successful in a range of challenging activities, including identifying product candidates, completing preclinical testing and clinical trials of product candidates, obtaining marketing approval for these product candidates, manufacturing, marketing and selling those products for which we may obtain marketing approval and satisfying any post-marketing requirements. We may never succeed in these activities and, even if we do, may never generate revenues that are significant or large enough to achieve profitability. Our product candidates and research programs are currently only in the early stages of development. Because of the numerous risks and uncertainties associated with developing product candidates, we are unable to predict the extent of any future losses or when we will become profitable, if at all. If we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would decrease the value of our company and could impair our ability to raise capital, maintain our research and development efforts, expand our business or continue our operations. A decline in the value of our company could also cause our stockholders to lose all or part of their investments in us.

We will need substantial additional funding. If we are unable to raise capital when needed, we would be forced to delay, reduce or eliminate our research and product development programs or future commercialization efforts.

We expect our expenses to increase in connection with our ongoing activities, particularly as we initiate the clinical development of VOR33 in acute myeloid leukemia ("AML"), advance our VCAR33 program through clinical development, initiate clinical development of the VOR33/VCAR33 Treatment System and otherwise continue to advance our research programs in support of our pipeline. In addition, if we obtain marketing approval for VOR33, VCAR33 and/or the VOR33/VCAR33 Treatment System, or any other product candidates we may develop, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution to the extent that such sales, marketing, manufacturing and distribution are not the responsibility of a collaborator. In addition, relative to previous years when we were a private company, we expect to incur significant additional costs associated with operating as a public company in 2021 and future years. Accordingly, we will need to obtain substantial additional funding in in order to maintain our continuing operations. If we are unable to raise capital when needed or on attractive terms, we would be forced to delay, reduce or eliminate our research and product development programs or future commercialization efforts.

As of December 31, 2020, our cash and cash equivalents were $48.5 million. We expect that the net proceeds from our initial public offering ("IPO") in February 2021 and the closing of the last tranche of our Series B preferred stock financing in January 2021, together with our existing cash and cash equivalents at December 31, 2020, will enable us to fund our operating expenses and capital expenditure requirements into the first quarter of 2023. However, our operating plan may change as a result of factors currently unknown to us, and we may need to seek funding sooner than planned. Our future capital requirements will depend on many factors, including:

- the progress, results and costs of clinical trials for VOR33, VCAR33 and the VOR33/VCAR33 Treatment System, including any COVID-19-related delays or other effects on our development programs;
- the costs of continuing to build our technology platform, including in-licensing additional genome engineering technologies for use in developing our product candidates;

- the costs of developing, acquiring or in-licensing additional targeted therapies to use in combination or in sequence with VOR33 and other eHSC product candidates we may develop;
- the scope, progress, results and costs of discovery, preclinical development, formulation development and clinical trials for other product candidates we may develop;
- the scope, progress, results and costs of discovery, preclinical development, formulation development and clinical trials for other product candidates we may develop;
- the costs of expanding our facilities, including developing internal manufacturing capabilities;
- the costs of preparing, filing and prosecuting patent applications, maintaining and enforcing our intellectual property and proprietary rights and defending intellectual property-related claims in the United States and internationally;
- the costs, timing and outcome of regulatory review of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop;
- the costs of future activities, including product sales, medical affairs, marketing, manufacturing, distribution, coverage and reimbursement for any product candidates for which we receive regulatory approval;
- our ability to establish and maintain collaborations on favorable terms, if at all;
- the success of any collaborations that we may establish and of our license agreements;
- the achievement of milestones or occurrence of other developments that trigger payments under any collaboration agreements we enter;
- the extent to which we acquire or in-license product candidates, intellectual property and technologies;
- the extent to which we develop or in-license manufacturing and distribution technologies; and
- the costs of operating as a public company.

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 develop product candidates and those are approved, we 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 at all. Accordingly, we will need to continue to rely on additional financing to achieve our business objectives.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize product candidates. We cannot be certain that additional funding will be available on acceptable terms, or at all. 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 product candidates or other research and development initiatives. Our license agreements and any future collaboration agreements may also be terminated if we are unable to meet the payment or other obligations under the agreements. We could be required to seek collaborators for product candidates 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 in markets where we otherwise would seek to pursue development or commercialization ourselves.

If we are unable to obtain funding on a timely basis, we may be required to significantly curtail, delay or discontinue one or more of our research or development programs or the commercialization of any product candidate, or be unable to expand our operations or otherwise capitalize on our business opportunities, as desired, which could materially affect our business, financial condition and results of operations. 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, 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 product revenues, we expect to finance our cash needs through a combination of equity offerings, government or private party grants, debt financings, collaborations, strategic alliances and licensing arrangements. We do not currently have any committed external source of funds. To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholders' ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect rights of our common stockholders. 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, making capital expenditures, declaring dividends and possibly other restrictions.

If we raise funds through collaborations, strategic alliances 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 we may have to grant licenses on terms that may not be favorable to us or commit to providing us with future payment streams. If we are unable to raise additional funds through equity or debt financings when needed, 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. Market volatility resulting from the COVID-19 pandemic or other factors may further adversely impact our ability to access capital as and when needed.

We have a limited operating history, have not yet completed any clinical trials and have no history of commercializing products, which may make it difficult to evaluate the success of our business to date and to assess our future viability.

We are an early-stage cell therapy company. We were founded in December 2015 and commenced operations in February 2016. Our operations to date have been limited to organizing and staffing our company, business planning, raising capital, acquiring and developing our platform and technology, identifying product candidates and undertaking preclinical studies. VCAR33 is in the early stages of clinical development. We have not enrolled a patient in our Phase 1/2a clinical trial for VOR33 yet, but plan to do so in the second quarter of 2021. We have not yet submitted an Investigational New Drug ("IND") application for the VOR33/VCAR33 Treatment System and our other programs are still in the preclinical or research stage. The risk of failure for these activities is high. We have not yet demonstrated an ability to initiate or successfully complete any clinical trials, including large-scale, pivotal clinical trials, obtain marketing approvals, manufacture a commercial-scale product or arrange for a third party to do so on our behalf or conduct sales and marketing activities necessary for successful commercialization. Consequently, any predictions made about our future success or viability may not be as accurate as they could be if we had a longer operating history.

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

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

We have never generated revenue from product sales and may never become profitable.

Our ability to generate revenue from product sales and achieve profitability depends on our ability, alone or with collaborators, to successfully complete the development of, and obtain the regulatory approvals necessary to commercialize, product candidates. We do not anticipate generating revenues from product sales for the next several

years, if ever. Our ability to generate future revenue from product sales depends heavily on our, or our future collaborators', ability to successfully:

- initiate and complete clinical development of VOR33;
- complete clinical development of VCAR33;
- initiate and complete clinical development of the VOR33/VCAR33 Treatment System;
- complete research and preclinical and clinical development of any other product candidates we may identify;
- seek and obtain regulatory and marketing approvals for any product candidates for which we complete clinical trials;
- launch and commercialize any product candidates for which we obtain regulatory and marketing approval by establishing a sales force, marketing and distribution infrastructure or, alternatively, collaborating with a commercialization partner;
- qualify for coverage and adequate reimbursement by government and third-party payors for any product candidates for which we obtain regulatory and marketing approval;
- develop, maintain and enhance a sustainable, scalable, reproducible and transferable manufacturing process for VOR33, VCAR33 and any other product candidates we may develop;
- establish and maintain supply and manufacturing relationships with third parties that can provide adequate, in both amount and quality, products and services to support clinical development and the market demand for any product candidates for which we obtain regulatory and marketing approval;
- obtain market acceptance of product candidates as viable treatment options;
- address competing technological and market developments;
- implement internal systems and infrastructure, as needed;
- negotiate favorable terms in any collaboration, licensing or other arrangements into which we may enter and performing our obligations in such arrangements;
- maintain, protect, enforce, defend and expand our portfolio of intellectual property rights, including patents, trade secrets and know-how, in the United States and internationally;
- avoid and defend against third-party interference, infringement and other intellectual property claims in the United States and internationally; and
- attract, hire and retain qualified personnel.

Even if one or more of the product candidates we develop are approved for commercial sale, we anticipate incurring significant costs associated with commercializing any approved product candidate. Our expenses could increase beyond expectations if we are required by the U.S. Food and Drug Administration (the "FDA"), the European Medicines Agency (the "EMA") or other regulatory authorities to perform clinical and other studies in addition to those that we currently anticipate. Even if we are able to generate revenues from the sale of any approved product candidates, we may not become profitable and may need to obtain additional funding to continue operations.

Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would decrease the value of our company and could impair our ability to raise capital, maintain our research and development efforts, expand our business or continue our operations. A decline in the value of our company also could cause stockholders to lose all or part of their investment in us.

Our ability to utilize our net operating loss carryforwards and certain other tax attributes to offset taxable income or taxes may be limited.

As of December 31, 2020, we had gross federal net operating loss carryforwards of $54.8 million including $52.9 million that had an indefinite carryforward period and $1.9 million that were subject to expiration at various dates through 2037. Furthermore, we have state and local net operating loss carryforwards of $49.3 million which will expire at various dates through 2040. Portions of these net operating loss carryforwards could expire unused and be unavailable to offset future income tax liabilities. Under the legislation enacted in 2017, informally titled the Tax Cuts and Jobs Act (the "Tax Act"), as modified by the Coronavirus Aid, Relief, and Economic Security (the "CARES Act") U.S. federal net operating losses incurred in taxable years beginning after December 31, 2017, may be carried forward indefinitely, but the deductibility of such federal net operating losses in taxable years beginning after December 31, 2020, is limited. It is uncertain how various states will respond to the Tax Act and the CARES Act. For state income tax purposes, there may be periods during which the use of net operating loss carryforwards is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended (the "Code"), and corresponding provisions of state law, if a corporation undergoes an "ownership change," which is generally defined as a greater than 50% change, by value, in its equity ownership over a three-year period, the corporation's ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes to offset its post-change income or taxes may be limited. The completion of our IPO, together with private placements and other transactions that have occurred since our inception, may trigger such an ownership change pursuant to Section 382 of the Code. We have not yet completed a Section 382 analysis, and therefore, there can be no assurances that our net operating losses are not already limited. We may experience ownership changes as a result of subsequent shifts in our stock ownership, some of which may be outside of our control. If an ownership change occurs and our ability to use our net operating loss carryforwards is materially limited, it would harm our future operating results by effectively increasing our future tax obligations. There is a full valuation allowance for net deferred tax assets, including net operating loss carryforwards.

Risks Related to Discovery, Development, Manufacturing and Commercialization

eHSCs are a novel technology that is not yet clinically validated for human use. The approaches we are taking to create eHSCs are unproven and may never lead to marketable products.

We are developing VOR33 and other eHSCs for transplant into the human body. Although there have been significant advances in the field of genome engineering in recent years, these technologies have rarely been applied to hematopoietic stem cells ("HSCs"), and our approach is new and largely unproven. The scientific evidence to support the feasibility of developing eHSCs is both preliminary and limited. Successful development of eHSCs by us will require solving a number of challenges, including:

- obtaining regulatory authorization from the FDA and other regulatory authorities, which have limited or no experience with regulating the development and commercialization of eHSCs, to proceed with clinical trials;
- identifying appropriate genetic targets for modification within HSCs;
- developing and deploying consistent and reliable processes for procuring cells from consenting third-party donors, isolating HSCs from such donor cells, inactivating genetic targets within such HSCs, storing and transporting the resulting eHSCs for therapeutic use and finally infusing these eHSCs into patients;
- utilizing these eHSC product candidates in combination or in sequence with companion therapeutics, which may increase the risk of adverse side effects;
- avoiding potential complications of eHSC transplants, including failure to engraft, rejection by host or lack of functionality, any of which could result in serious side effects or death;
- educating medical personnel regarding the potential side effect profile of our product candidates, particularly those that may be unique to our eHSCs;

- understanding and addressing variability in the quality of a donor's cells, which could ultimately affect our ability to manufacture product in a reliable and consistent manner;
- developing processes for the safe administration of eHSC products, including long-term follow-up and registries, for all patients who receive these product candidates;
- relying on third parties to find suitable healthy donors;
- obtaining regulatory approval from the FDA and other regulatory authorities;
- manufacturing product candidates to our specifications and in a timely manner to support our clinical trials and, if approved, commercialization;
- sourcing clinical and, if approved by applicable regulatory authorities, commercial supplies for the materials used to manufacture and process product candidates;
- developing a manufacturing process and distribution network that can provide a stable supply with a cost of goods that allows for an attractive return on investment; and
- establishing sales and marketing capabilities ahead of and after obtaining any regulatory approval to gain market acceptance, and obtaining coverage, adequate reimbursement and pricing by third-party payors and governmental healthcare programs.

We have concentrated our research efforts to date on preclinical work to bring VOR33 into clinical development for the treatment of AML, and our future success is highly dependent on the successful development of eHSCs, such as VOR33, and the therapeutic applications of these cells. We may decide to alter or abandon our initial programs as new data become available and we gain experience in developing eHSCs. We cannot be sure that our programs will yield satisfactory products that are safe and effective, scalable or profitable in our initial indication or any other indication we pursue.

Moreover, actual or perceived safety issues, including as a result of adverse developments in our eHSC programs or in genome engineering programs undertaken by third parties or of the adoption of novel approaches to treatment, may adversely influence the willingness of subjects to participate in our clinical trials, or, if one of our product candidates is approved by applicable regulatory authorities, of physicians to subscribe to the novel treatment mechanics or of patients to provide consent to receive a novel treatment despite its regulatory approval. The FDA or other applicable regulatory authorities may require specific post-market studies or additional information that communicates the benefits or risks of our products. New data may reveal new risks of our product candidates at any time prior to or after regulatory approval.

We are substantially dependent on the success of our two most advanced product candidates, VOR33 and VCAR33. If we are unable to complete development of, obtain approval for and commercialize VOR33 or VCAR33 in a timely manner, our business will be harmed.

Our future success is dependent on our ability to timely advance and complete clinical trials, obtain marketing approval for and successfully commercialize our product candidates VOR33 and VCAR33. We are investing significant efforts and financial resources in the research and development of these product candidates. Our IND application for VOR33 in combination with Mylotarg in patients with AML was accepted by the FDA in in January 2021 and we expect to initiate our Phase 1/2a clinical trial of VOR33 by enrolling the first patient in the second quarter of 2021. VCAR33 is also undergoing a multi-site, investigator-initiated Phase 1/2 clinical trial in relapsed AML patients as a monotherapy in a bridge-to-transplant setting. The VCAR33 trial is currently sponsored and overseen by the National Marrow Donor Program ("NMDP"), however, we expect to either assume sponsorship and oversight of the trial prior to its completion or enter into an agreement with the NMDP providing us with the right to cross-reference the trial results in future IND applications that we may submit to the FDA. VOR33 and VCAR33 will each require additional clinical development, evaluation of clinical, preclinical and manufacturing activities, marketing approval from government regulators, substantial investment and significant marketing efforts before we can generate any revenues from product sales. We are not permitted to market or promote VOR33,

VCAR33 or any other product candidate, before we receive marketing approval from the FDA and comparable foreign regulatory authorities, and we may never receive such marketing approvals.

The success of VOR33 and VCAR33 will depend on several factors, including the following:

- the acceptance of individual investigational review boards ("IRBs") and scientific review committees at each clinical trial site as to the adequacy of the preclinical data package to support clinical development of VOR33 and their overall general agreement with the use of VOR33 in the intended patient population in the intended manner;
- the willingness of clinical investigators to place patients in the clinical trials, and the willingness of patients to enroll in a clinical trial studying a first-in-human cell therapy;
- the successful and timely completion of our planned Phase 1/2a clinical trial of VOR33 and the ongoing Phase 1/2 clinical trial of VCAR33;
- our ability to incorporate the results of the ongoing Phase 1/2 clinical trial of VCAR33 for the treatment of AML into future regulatory filings, either as a result of the timely transfer to us by the NMDP of the related IND or obtaining cross-reference rights to those trial results;
- the initiation and successful patient enrollment and completion of additional clinical trials of VOR33 and VCAR33 on a timely basis;
- maintaining and establishing relationships with contract research organizations ("CROs") and clinical sites for the clinical development of VOR33 and VCAR33 both in the United States and internationally;
- the frequency and severity of adverse events in the clinical trials;
- the results of clinical trials conducted by third parties in hematopoietic stem cell transplant ("HSCT") if such trials result in changes to the standard of care for HSCT or otherwise cause us to change our clinical trial protocols; for example, the National Heart, Lung, and Blood Institute ("NHLBI"), in collaboration with the Blood and Marrow Transplant Clinical Trials Network and the National Cancer Institute, sponsored a Phase 3 clinical trial of the use in HSCT of CD34 selected T cell depleted HSCs ("CD34 HSCs"), which are the same types of cells used in manufacturing VOR33, in patients with acute leukemia or myelodysplasia; we are currently evaluating the data and if we believe we need to significantly amend our process after further analysis, then our planned Phase 1/2a clinical trial of VOR33 could be significantly delayed;
- the efficacy, safety and tolerability profiles that are satisfactory to the FDA, EMA or any comparable foreign regulatory authority for marketing approval;
- the timely receipt of marketing approvals for VOR33 and VCAR33 from applicable regulatory authorities;
- the extent of any required post-marketing approval commitments to applicable regulatory authorities;
- the maintenance of existing or the establishment of new supply arrangements with third-party suppliers and manufacturers for clinical development of VOR33 and VCAR33;
- the maintenance of existing, or the establishment of new, scaled production arrangements with third-party manufacturers to obtain finished products that are appropriate for commercial sale of VOR33 and VCAR33, if either is approved;
- obtaining and maintaining patent protection, trade secret protection and regulatory exclusivity, both in the United States and internationally;
- the protection of our rights in our intellectual property portfolio;
- the successful launch of commercial sales following any marketing approval;
- a continued acceptable safety profile following any marketing approval;
- commercial acceptance by patients, the medical community and third-party payors;

- our ability to obtain coverage and adequate reimbursement from third-party payors for our products and patients' willingness to pay out-of-pocket in the absence of such coverage and adequate reimbursement; and
- our ability to compete with other treatments.

With respect to the NHLBI trial above, results of the trial were presented orally at a scientific conference in February 2021. The NHLBI trial did not observe a statistically significant difference between the CD34 HSC grafts and the bone marrow grafts that served as a comparison with respect to the primary endpoint of graft versus host disease ("GVHD") (moderate/severe) relapse-free survival at 12 months. There was a statistically significantly lower incidence of chronic GVHD in the CD34 HSC arm of the trial. There was also a statistically significantly higher incidence of treatment related mortality ("TRM") in the CD34 HSC arm, contributing to poorer overall survival compared to the bone marrow arms. At the time of the oral presentation of the abstract regarding this study, trial investigators attributed the increased TRM in the CD34 selected arm in large part to higher infectious complications. Further analyses are ongoing as to the exact nature of these complications, and what, if any, interventions may be available for their prevention or treatment. If and as we learn more about the results of the NHLBI trial, we may decide that the clinical trial protocol or manufacturing process for VOR33 merit changes in response to this new information. Any amendments to our clinical trial protocol to accommodate these changes could introduce delays into our current clinical development timeline, including delays in initiating our first-in-human clinical trial of VOR33. Additional results from this third party trial may also result in enrollment delays.

We do not have complete control over many of these factors, including certain aspects of clinical development and the regulatory submission process, potential threats to our intellectual property rights and the manufacturing, marketing, distribution and sales efforts of any future collaborator. If we are not successful with respect to one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize VOR33 and/or VCAR33, which would materially harm our business. If we do not receive marketing approvals for VOR33 and VCAR33 we may not be able to continue our operations.

We may not be successful in our efforts to identify, develop and commercialize additional 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 additional product candidates based on, or complementary with, our technology platform. While VCAR33 is currently undergoing a Phase 1/2 clinical trial, and while we expect to initiate the VOR33 Phase 1/2a clinical trial by enrolling the first patient in the second quarter of 2021, all of our other product development programs are still in the research or preclinical stage of development. Our research programs may fail to identify additional product candidates for clinical development for a number of reasons. Our research methodology may be unsuccessful in identifying 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 efficacy 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. The historical failure rate for product candidates is high due to risks relating to safety, efficacy, clinical execution, changing standards of medical care and other unpredictable variables. In addition, although we believe our technology platform will position us to rapidly expand our portfolio of product candidates beyond our current product candidates, our ability to expand our portfolio may never materialize.

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.

If VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any of the other 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 their commercial potential or result in significant negative consequences following any potential marketing approval.

We have not yet completed any human clinical trials of our product candidates and it is impossible to predict when or if VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop will prove safe in humans. Undesirable side effects caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or comparable foreign regulatory authorities. Results of our clinical trials could reveal a high and unacceptable severity and prevalence of side effects or unexpected characteristics.

There have been no clinical trials of eHSCs and a limited number of clinical trials of certain of the technologies we are using to engineer eHSCs and chimeric antigen receptor ("CAR")-T cells, including the CRISPR/Cas9 method we are using in our VOR33 program. In the genetic medicine field, there have been several significant adverse events from genetically engineered treatments in the past, including reported cases of leukemia and death. There have also been recent studies suggesting that genome engineering using the CRISPR-Cas9 method may increase the risk that the modified cells themselves become cancerous or otherwise dysfunctional. There can be no assurance that our eHSCs or CAR-T cells or the genome engineering techniques that we employ in their development will not cause undesirable side effects, as improper modification of a patient's DNA could lead to lymphoma, leukemia or other cancers, or other aberrantly functioning cells.

A significant risk in any genetically engineered product candidate is that "off-target" gene alterations may occur, which could cause serious adverse events, undesirable side effects or unexpected characteristics. Although we and others have demonstrated the ability to improve the specificity of gene alterations in a laboratory setting, we cannot be certain that off-target alterations will not occur in any of our planned or future clinical trials, and the lack of observed side effects in preclinical studies does not guarantee that such side effects will not occur in human clinical trials.

There is also the potential risk of delayed adverse events following exposure to genetically engineered cells due to the permanence of changes to DNA or due to other components of product candidates used to carry the genetic material. Further, because our genome engineering technology makes a permanent change, the treatment cannot be withdrawn, even after a side effect is observed. For example, our eHSCs are designed to permanently reconstitute the blood cells necessary for the survival of HSCT patients, and we cannot be certain that these changes will not induce adverse reactions in patients or impair the functionality of the resulting blood cells. The eHSC manufacturing process generally, and the removal of surface targets such as CD33 specifically, could have temporary or permanent harmful effects. The removal of CD33 from HSCs has never been studied in clinical trials. While we have discovered anonymous individuals in genome databases who lack CD33, we cannot be certain that these databases are accurate or complete or that the individuals who have contributed DNA to the database are healthy, as comprehensive health information is not included in the databases we have consulted. The removal of CD33 or other surface targets we remove from HSCs could have serious harmful effects, including the impairment of the ability of our eHSCs to migrate to patients' bone marrow, survive and reconstitute properly functioning blood cells. These side effects may not be evident for years after transplant.

In addition to side effects and adverse events that may be caused by our eHSCs, HSCT is itself a complicated and risky procedure. The conditioning, administration process or related procedures which may be used in HSCT can cause adverse side effects and adverse events. An HSCT patient is generally administered cytotoxic drugs to remove stem cells from the bone marrow to create sufficient space in the bone marrow for the modified stem cells to engraft and produce new cells. This procedure compromises the patient's immune system. In addition, the HSCs administered via transplant may fail to engraft in patients' bone marrow, or could be rejected by the patient, either of which could result in serious side effects, including death. If in the future we are unable to demonstrate that such adverse events were caused by the elements of the HSCT process unrelated to our eHSCs, the FDA, the European Commission, the Competent Authorities of the Member States of the European Union, EMA or other regulatory authorities could order us to cease further development of, or deny approval of, our eHSCs for any or all target indications. Even if we are able to demonstrate that adverse events are not related to our product candidates, or are merely a feature of HSCT generally, such occurrences could affect patient recruitment, the ability

of enrolled patients to complete the clinical trial, or the commercial viability of any product candidates that obtain regulatory approval.

Furthermore, in previous and ongoing clinical trials involving CAR-T or other cell-based therapies from other companies, patients experienced side effects such as neurotoxicity and cytokine release syndrome. There have been life threatening events related to severe neurotoxicity and cytokine release syndrome, requiring intense medical intervention such as intubation or pressor support, and in several cases, resulting in death. Severe neurotoxicity is a condition that is currently defined clinically by cerebral edema, confusion, drowsiness, speech impairment, tremors, seizures, or other central nervous system side effects, when such side effects are serious enough to lead to intensive care. In some cases, severe neurotoxicity was thought to be associated with the use of certain lymphodepletion regimens used prior to the administration of the CAR-T or other cell-based therapies. Cytokine release syndrome is a condition that is currently defined clinically by certain symptoms related to the release of cytokines, which can include fever, chills, low blood pressure, when such side effects are serious enough to lead to intensive care with mechanical ventilation or significant vasopressor support. The exact cause or causes of cytokine release syndrome and severe neurotoxicity in connection with treatment of CAR-T or other cell-based therapies is not fully understood at this time. In addition, patients have experienced other adverse events in these trials, such as a reduction in the number of blood cells (in the form of neutropenia, thrombocytopenia, anemia or other cytopenias), febrile neutropenia, chemical laboratory abnormalities (including elevated liver enzymes) and renal failure.

The delivery modalities of certain of our product candidates may also cause serious adverse events. For example, in order to administer VCAR33, we employ viral vectors, including lentiviruses, which are relatively new approaches used for disease treatment. In past clinical trials that were conducted by others with lentivirus vectors, several significant side effects were caused by gene therapy treatments, including reported cases of leukemia and death. Other potential side effects could include an immunologic reaction and insertional oncogenesis, which is the process whereby the insertion of a functional gene near a gene that is important in cell growth or division results in uncontrolled cell division, which could potentially enhance the risk of malignant transformation. If the vectors we use demonstrate a similar side effect, or other adverse events, we may be required to halt or delay further clinical development of VCAR33 and potential product candidates. Furthermore, the FDA has stated that lentiviral vectors possess characteristics that may pose high risks of delayed adverse events.

Undesirable side effects caused by VCAR33 or other cell-based companion therapeutics we may develop could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of marketing approval by the FDA or other comparable foreign regulatory authorities. In some cases, side effects such as neurotoxicity or cytokine release syndrome have resulted in clinical holds of ongoing clinical trials and/or discontinuation of the development of the product candidate. Results of our studies could reveal a high and unacceptable severity and prevalence of side effects or unexpected characteristics. Treatment-related side effects could also affect patient recruitment or the ability of enrolled patients to complete the trials or result in potential product liability claims. In addition, these side effects may not be appropriately recognized or managed by the treating medical staff, as toxicities resulting from T cell-based immunotherapies are not normally encountered in the general patient population and by medical personnel. Medical personnel may need additional training regarding T cell-based immunotherapy product candidates to understand their side effects. Inadequate training in recognizing or failure to effectively manage the potential side effects of T cell-based immunotherapy product candidates could result in patient deaths. Any of these occurrences may harm our business, financial condition and prospects significantly.

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. Many product candidates that initially showed promise in early stage testing have later been found to cause side effects that prevented further clinical development of the product candidates.

Additionally, if we successfully develop a product candidate and it receives marketing approval, the FDA could require us to adopt a Risk Evaluation and Mitigation Strategy (“REMS”), to ensure that the benefits of

treatment with such product candidate outweighs the risks for each potential patient, which may include, among other things, a medication guide outlining the risks of the product for distribution to patients, a communication plan to health care practitioners, extensive patient monitoring or distribution systems and processes that are highly controlled, restrictive and more costly than what is typical for the industry. Furthermore, if we or others later identify undesirable side effects caused by a product candidate, several potentially significant negative consequences could result, including:

- regulatory authorities may suspend or withdraw approvals of such product candidate;
- regulatory authorities may require additional warnings on the label or limit the approved use of such product candidate;
- we may be required to change the way the product is administered, or implement other changes to the labeling or handling of a product, if approved;
- we may be required to conduct additional clinical trials;
- we could be sued and held liable for harm caused to patients; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of product candidates and could have a material adverse effect on our business, financial condition, results of operations and prospects.

We have not successfully tested our product candidates in clinical trials and any favorable preclinical results are not predictive of results that may be observed in clinical trials.

We have not successfully tested our product candidates in clinical trials, and 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. Data obtained from preclinical and clinical activities are subject to varying interpretations, which may delay, limit or prevent regulatory approval. In addition, regulatory delays or rejections may be encountered as a result of many factors, including changes in regulatory policy during the period of product development. Any such adverse events may cause us to delay, limit or terminate planned clinical trials, any of which would have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, the results of preclinical studies may not be predictive of the results of later-stage preclinical studies or clinical trials. To date, we have generated only limited preclinical study data and no clinical trial results, and any such data or results do not ensure that later preclinical studies or clinical trials will produce similar outcomes. 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 product candidates.

Furthermore, the IND for the T cell therapy candidate using the same CAR construct as VCAR33 is currently held, and this clinical trial is currently sponsored, by the NMDP. As such, the NMDP is responsible for all aspects of this trial, including the design of the trial, the manufacture of study product, the enrollment, dosing and follow-up of patients, the recording of trial data and the analysis of results. We also did not control the preclinical development of this T cell therapy candidate, which was conducted by the NIH, and we do not have rights under the license agreement to certain intellectual property, such as know-how, employed by the NMDP in manufacturing study product or conducting its clinical trial. As such, we are relying on the NMDP to transfer the IND for this T cell therapy candidate to us in a timely fashion or to otherwise grant us the right to cross-reference the results of the trial in future IND applications. In the event such transfer or grant of rights does not occur, our ability to conduct clinical development of VCAR33 could be delayed or otherwise adversely affected. Additionally, in the event we cross-reference these trial results in an IND application for VCAR33, we will be required to demonstrate that VCAR33 is comparable to the T cell therapy studied in the NMDP trial, which will require us to show that our manufacturing processes and construct release specifications are sufficiently comparable to those employed in the NMDP trial. In

determining comparability, we expect the FDA to evaluate whether and to what extent any changes in our process and specifications are likely to have an adverse effect on the quality, safety and efficacy of VCAR33 in comparison to the T cell therapy studied in the NMPD trial. We may be unable to establish the comparability of the product candidate investigated under the NMDP IND and our IND for VCAR33 in the event of manufacturing changes, or the FDA or other regulatory authorities may otherwise disagree with the sufficiency of our right of reference to the preclinical, manufacturing or clinical data generated by the NMDP's trial or our interpretation of preclinical, manufacturing or clinical data from this trial. If so, regulatory authorities may require us to obtain and submit additional preclinical, manufacturing or clinical data before we may initiate further clinical trials and/or obtain any regulatory approvals. For example, we may be required to conduct additional preclinical toxicology studies, requalify manufacturing processes or conduct further clinical investigation of VCAR33 before advancing our VCAR33 program.

We are also relying on NIH to have conducted its research and development efforts, and on the NMDP to conduct its clinical trial, in accordance with applicable protocol, legal, regulatory and scientific standards, to accurately report the results of preclinical studies and clinical trials, and to correctly collect and interpret the data from these studies and trials. To the extent any of these has not occurred or does not occur, the expected time and costs of developing VCAR33, as well as the VOR33/VCAR33 Treatment System, may be increased, which could adversely affect our business. Furthermore we do not control, and if the IND for VCAR33 is not transferred to us by the NMDP we will not control, the timing of the ongoing NMDP trial or the release of information about the trial, including trial results, all of which negatively affect our ability to accurately estimate the timing of anticipated trial milestones. As a result, our estimates may prove to be inaccurate. The NMDP also may not publicize data from the trial in a manner that facilitates further clinical development of VCAR33 by us, or at all. In addition, even if the IND for the ongoing Phase 1/2 clinical trial of the T cell therapy using the same CAR construct as VCAR33 is transferred to us, or if we gain cross-reference rights, the NMDP may retain rights to publicize data from the trial. The NMDP may elect to publicize this data at a time or in a manner other than we desire or may interpret data from these trials in a manner differently than we do, any of which could harm our business.

Development of a product candidate such as VOR33, which is intended for use in combination or in sequence with an already approved therapy, will present increased complexity and more or different challenges than development of a product candidate for use as a single agent.

We expect that our product candidate VOR33, and any other eHSC product candidates that we may develop, will be required to be used in combination or in sequence with existing or future therapies in order to demonstrate more anti-cancer efficacy than unmodified HSCs. In particular, our Phase 1/2a clinical trial will evaluate VOR33 in combination with Mylotarg and we anticipate conducting future trials of VOR33 with VCAR33 as a companion therapeutic in the VOR33/VCAR33 Treatment System, and also potentially with other targeted therapies. Developing product candidates for use in combination or sequence with other therapies will present challenges. For example, the FDA may require us to use more complex clinical trial designs to evaluate the contribution of each product and product candidate to any observed effects. Moreover, following product approval, the FDA may require that products used in conjunction with each other be cross-labeled, which would require consent from the sponsoring company. To the extent that we do not have rights to already approved products, this may require us to work with another company to satisfy such a requirement. For example, we do not have and do not currently plan to enter into a cross-labeling agreement with Pfizer with respect to Mylotarg, and therefore any such cross-labeling requirement from the FDA would require us to negotiate such an agreement with Pfizer. In addition, developments related to the already approved therapies may impact our clinical trials for the combination as well as our commercial prospects should we receive marketing approval. Such developments may include changes to the approved therapy's safety or efficacy profile, changes to the availability of the approved therapy, changes to the standard of care and a decision by the sponsoring company to withdraw the therapy from the market. For example, Mylotarg was voluntarily withdrawn from the market in 2010 after post-approval testing indicated increased risks of hepatic veno-occlusive disease, or blockage of veins in the liver. Mylotarg was re-approved in 2017 with a lower recommended dose and for use in a new patient population. Also, while we do not currently require a license from or agreement with Pfizer to permit us to conduct clinical trials or, if approved, to commercialize VOR33 with Mylotarg as a companion therapeutic, we do not have and do not plan to enter into a supply or license agreement with Pfizer that would require Pfizer to produce Mylotarg, or permit us to otherwise produce Mylotarg, for these purposes. If Mylotarg undergoes subsequent labeling changes, or if Mylotarg is again removed from the market due to renewed concerns

about its safety profile, or for other reasons, our planned clinical trial of VOR33, and our prospects for commercializing VOR33, will be materially adversely affected.

Furthermore, we will not be able to market and sell VOR33 or any product candidate we develop in combination with an unapproved cancer therapy, such as VCAR33 or other cell-based companion therapeutics, for a combination indication, if that unapproved therapy does not ultimately obtain marketing approval either alone or in combination with our product. To our knowledge, the FDA has not previously approved combined cell therapies, and we cannot be certain whether the FDA will apply existing guidance to cell therapies product candidates, such as the VOR33/VCAR33 Treatment System, or will otherwise apply existing guidance in novel ways. In addition, unapproved cancer therapies face the same risks described with respect to our product candidates currently in development and clinical trials, including the potential for serious adverse effects, delay in their clinical trials and lack of FDA approval. If the FDA, EMA or comparable foreign regulatory authorities do not approve these other drugs or revoke their approval of, or if safety, efficacy, quality, manufacturing or supply issues arise with, the drugs we choose to evaluate in combination with any product candidate we develop, we may be unable to obtain approval of or market such combination therapy.

Any inability to develop targeted therapies for use with our product candidate, any failure to maintain or enter into new successful commercial relationships with respect to targeted therapies, or the expense of purchasing targeted therapies in the market, may delay our development timelines, increase our costs and jeopardize our ability to develop our current product candidates and any future product candidates as commercially viable therapies. If any of these occur, our business, financial condition, results of operations, stock price and prospects may be materially harmed.

If we are unable to successfully develop our current programs into a comprehensive portfolio of product candidates, or experience significant delays in doing so, we may not realize the full commercial potential of our current and future product candidates.

We are developing VOR33 so that it can be used in combination or in sequence with other product candidates that we in-license or develop ourselves, and we are focused on a product development strategy that includes leveraging the synergies among a comprehensive portfolio of our product candidates. For example, if the initial clinical trials of VOR33 and VCAR33 are each successful, we anticipate conducting clinical trials of VOR33 in combination or in sequence with VCAR33 as a companion therapeutic, which we refer to as the VOR33/VCAR33 Treatment System, for the treatment of myeloid malignancies such as AML. Our success may depend, in part, on our ability to develop a complementary product portfolio with product candidates that will address a major limitation of existing therapies. Given our limited experience in developing product candidates that have received marketing approval, we may not be successful in developing some of our product candidates. The failure of one of our product candidates to obtain regulatory approval or market acceptance may affect our ability to expand our market opportunities for our other product candidates or programs. Although we may develop product candidates that ultimately obtain marketing approval, if we are unable to successfully develop our current programs into a comprehensive portfolio of product candidates, or experience significant delays in doing so, we may not realize the full commercial potential of our current and future product candidates.

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 focus on product candidates and research programs that we identify for specific indications among many potential options. As a result, 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 product candidates and research and development programs 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. Any such event could have a material adverse effect on our business, financial condition, results of operations and prospects.

Even if a product candidate receives marketing approval, it may fail to achieve the degree of market acceptance by physicians, patients, healthcare payors and others in the medical community necessary for commercial success.

The commercial success of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidate we may develop in the future will depend upon its degree of market acceptance by physicians, patients, third-party payors and others in the medical community. Ethical, social and legal concerns about genetic medicines generally and genome engineering technologies specifically could result in additional regulations restricting or prohibiting the marketing of our product candidates. Even if any product candidate we develop receives marketing approval, it may nonetheless fail to gain sufficient market acceptance by physicians, patients, healthcare payors and others in the medical community. The degree of market acceptance of any product candidate we develop, if approved for commercial sale, will depend on a number of factors, including:

- the efficacy and safety of such product candidate as demonstrated in clinical trials;
- the efficacy and safety of other products that are used in combination or in sequence with our product;
- the potential and perceived advantages of our product candidates compared to alternative treatments;
- the limitation to our targeted patient population and limitations or warnings contained in approved labeling by the FDA or other regulatory authorities;
- the ability to offer our products for sale at competitive prices;
- convenience and ease of administration compared to alternative treatments;
- the clinical indications for which the product candidate is approved by the FDA, the EMA or other regulatory agencies;
- public attitudes regarding genetic medicine generally and genome engineering technologies specifically;
- the willingness of the target patient population to try novel biologics and of physicians to prescribe these treatments, as well as their willingness to accept an intervention that involves the alteration of the patient's gene;
- product labeling or product insert requirements of the FDA, the EMA or other regulatory authorities, including any limitations or warnings contained in a product's approved labeling;
- relative convenience and ease of administration;
- the timing of market introduction of competitive products;
- publicity concerning our products or competing products and treatments;
- the strength of marketing and distribution support;
- availability of third-party coverage and sufficiency of reimbursement; and
- the prevalence and severity of any side effects.

Even if a product candidate is approved, such product may not achieve an adequate level of acceptance, we may not generate significant product revenues, and we may not become profitable.

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

We do not have a sales or marketing infrastructure and have limited experience in the sale, marketing or distribution of pharmaceutical products. To achieve commercial success for any approved product for which we retain sales and marketing responsibilities, we must either develop a sales and marketing organization or outsource these functions to third parties. In the future, we may choose to build a focused sales, marketing and commercial support infrastructure to sell, or participate in sales activities with our collaborators for, some of our product candidates if and when they are approved.

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

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

- our inability to recruit and retain adequate numbers of effective sales, marketing, reimbursement, customer service, medical affairs and other support personnel;
- the inability of sales personnel to obtain access to physicians or educate adequate numbers of physicians on the benefits of prescribing any future products;
- the inability of reimbursement professionals to negotiate arrangements for formulary access, reimbursement and other acceptance by payors;
- restricted or closed distribution channels that make it difficult to distribute our product candidates to segments of the patient population;
- the lack of complementary products to be offered by sales personnel, which may put us at a competitive disadvantage relative to companies with more extensive product lines; and
- unforeseen costs and expenses associated with creating an independent commercialization organization.

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

We face significant competition in an environment of rapid technological change, and there is a possibility that our competitors may achieve regulatory approval before us or develop therapies that are safer or more advanced or effective than ours, which may harm our financial condition and our ability to successfully market or commercialize VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop.

The development and commercialization of new drug and biologic products is highly competitive. Moreover, the genome engineering and oncology fields are characterized by rapidly changing technologies, significant competition and a strong emphasis on intellectual property. We will face competition with respect to VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates that we develop or commercialize in the future from major pharmaceutical companies, specialty pharmaceutical companies and

biotechnology companies worldwide. Potential competitors also include academic institutions, government agencies and other public and private research organizations that conduct research, seek patent protection and establish collaborative arrangements for research, development, manufacturing and commercialization.

There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of the disease indications for which we have product candidates and research programs. 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.

Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future that are approved to treat the same diseases for which we may obtain approval for our product candidates. This may include other types of therapies, such as small molecule, antibody and/or protein therapies.

Many of our current or potential competitors, either alone or with their collaboration partners, may 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, biotechnology and gene therapy industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize product candidates that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than our product candidates or that would render our product candidates obsolete or non-competitive. Our competitors also may obtain FDA or other regulatory approval for their product candidates 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. Additionally, technologies developed by our competitors may render our product candidates uneconomical or obsolete, and we may not be successful in marketing any product candidates against competitors.

In addition, as a result of the expiration or successful challenge of our patent rights, we could face more litigation with respect to the validity and/or scope of patents relating to our competitors' products. The availability of our competitors' products could limit the demand, and the price we are able to charge, for our product candidates, if approved.

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

VOR33 and VCAR33 are, and future eHSCs and CAR-T or other cell-based companion therapeutics we may develop will be, created by altering the human genome. The clinical and commercial success of our potential products will depend in part on public understanding and acceptance of the use of genome engineering for the prevention or treatment of human diseases. Public attitudes may be influenced by claims that genome engineering is unsafe, unethical or immoral, and, consequently, our current or future 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 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, genome engineering technology is subject to public debate and heightened regulatory scrutiny due to ethical concerns relating to the application of genome engineering technology to human embryos or the human germline. For example, in the United States, germline alteration for clinical application has been expressly prohibited since enactment of a December 2015 FDA ban on such activity. Prohibitions are also in place in the United Kingdom, across most of Europe, in China and many other countries around the world. In the United States,

the National Institutes of Health has announced that the agency would not fund any use of gene engineering technologies in human embryos, noting that there are multiple existing legislative and regulatory prohibitions against such work, including the Dickey-Wicker Amendment, which prohibits the use of appropriated funds for the creation of human embryos for research purposes or for research in which human embryos are destroyed.

Although we do not use our technologies to alter human embryos or the human germline, public debate about the use of genome engineering technologies in human embryos and heightened regulatory scrutiny could prevent or delay our development of product candidates. 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 competitors or of academic researchers utilizing genome engineering technologies, even if not ultimately attributable to product candidates we may identify and develop, and the accompanying 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 genome engineering 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.

Due to the novel nature of our eHSCs, the small patient population we are addressing and the potential for any product candidates we may develop to offer benefits in a single administration or limited number of administrations, we face additional uncertainty related to pricing, coverage and reimbursement for these product candidates.

The pricing and reimbursement of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any future product candidates we may develop, if approved, must be adequate to support the necessary commercial infrastructure. If we are unable to obtain adequate levels of reimbursement, our ability to successfully market and sell any such product candidates will be adversely affected. The manner and level at which reimbursement is provided for services related to a product candidate (e.g., for administration of our product candidates to patients) is also important. Inadequate reimbursement for such services may lead to physician and payor resistance and adversely affect our ability to market or sell any product candidate we develop.

We are initially developing product candidates targeting rare diseases with small patient populations. For products that are designed to treat smaller patient populations to be commercially viable, the reimbursement for such products must be higher, on a relative basis, to account for the lack of volume. Accordingly, we will need to implement a coverage and reimbursement strategy for any approved product candidate with a smaller patient population that accounts for the smaller potential market size. Even if we obtain coverage for a given product by a third-party payor, the resulting reimbursement payment rates may not be adequate.

We are also initially developing products that are designed to be used in a single administration. We expect the cost of a single administration of genetic treatments, such as those we are seeking to develop, to be substantial, when and if they achieve regulatory approval. We expect that coverage and reimbursement by governmental healthcare programs such as Medicare and Medicaid, private health insurers and other third-party payors will be essential for most patients to be able to afford these treatments. Accordingly, sales of any such product candidates will depend substantially, both domestically and abroad, on the extent to which the costs of any such product candidates will be paid by governmental healthcare programs, private health plans and other third-party payors. Payors may not be willing to pay high prices for a single administration. Coverage and reimbursement by a third-party payor and physician utilization may depend upon several 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.

There is significant uncertainty related to third-party coverage and reimbursement of eHSCs. For example, effective for cost reporting periods beginning on or after October 1, 2020, under the Medicare Hospital Inpatient Prospective Payment Systems ("IPPS"), Medicare payment to the hospital for hematopoietic stem cell acquisition, including the preparation and processing of stem cells derived from peripheral blood, will be made on a reasonable cost basis. We believe that this new rule may also apply to eHSC products. Alternatively, we may apply for Medicare's New Technology Add-on Payment ("NTAP") designation for our eHSC product candidates, which, if approved, may allow for temporary reimbursement for new cell therapies above the standard Medicare Severity Diagnosis-Related Group ("MS-DRG") payment amount under IPPS. NTAP will only be available for our product candidates, if approved, if we submit a timely and complete application and CMS determines that our product candidates meet the eligibility requirements of NTAP, including, among other criteria, demonstrating a substantial clinical improvement relative to services or technologies previously available. We also believe that, for patients covered by commercial insurance, reimbursement will be based on a case rate methodology with possible provisions for separate payments for new therapies, such as eHSC. However, we cannot be certain that our eHSCs would qualify for these carveouts or other reimbursement avenues for new therapies. We also may not be able to provide data sufficient to gain acceptance with respect to coverage and reimbursement. If coverage and reimbursement are not available, or are available only at limited levels, we may not be able to successfully commercialize a product candidate. Even if coverage is provided, the approved reimbursement amount may not be adequate to realize a sufficient return on our investment. If we are unable to obtain adequate levels of reimbursement, our ability to successfully market and sell any product candidates will be harmed.

We may need to develop new reimbursement models to realize adequate value for our product candidates. Payors may not be able or willing to adopt such new models, and patients may be unable to afford that portion of the cost that such models may require them to bear. If we determine such new models are necessary but we are unsuccessful in developing them, or if such models are not adopted by payors, our business, financial condition, results of operations and prospects could be adversely affected.

Outside the United States, international operations are generally subject to extensive governmental price controls and other market regulations, and we believe the increasing emphasis on cost-containment initiatives in Europe and other countries has and will continue to put pressure on the pricing and usage of our products. In many countries, the prices of medical products are subject to varying price control mechanisms as part of national health systems. Other countries allow companies to fix their own prices for medical products but monitor and control company profits. Additional foreign price controls or other changes in pricing regulation could restrict the amount that we are able to charge for our products. Accordingly, in markets outside the United States, the reimbursement for our products may be reduced compared with the United States and may be insufficient to generate commercially reasonable revenue and profits.

Our inability to promptly obtain coverage and profitable payment rates from both government-funded and private payors for any approved products we may develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

The market for VOR33, VCAR33 and certain future product candidates we may develop may be limited to those patients who are ineligible for or have failed, or are at risk of failing, prior treatments and who are able to tolerate the side effects of co-administered or sequentially administered targeted therapies, and our projections regarding the size of the addressable market may be incorrect.

Cancer therapies are sometimes characterized as first line, second line or third line, and the FDA often approves new therapies initially only for last line use. When blood cancers are detected, they are treated with first line of therapy with the intention of curing the cancer. This generally consists of chemotherapy, radiation, antibody drugs, tumor-targeted small molecules or a combination of these. In addition, for myeloid malignancies, HSCT is frequently added to the first line therapy after the combination chemotherapy is given. If the patient's cancer relapses, then they are given a second line or third line therapy, which can consist of more chemotherapy, radiation,

antibody drugs, tumor-targeted small molecules or a combination of these, or HSCT. Generally, the higher the line of therapy, the lower the chance of a cure. If a patient relapses after HSCT, the goal of the therapy in the treatment of AML is to control the growth of the tumor and extend the life of the patient, as a cure is unlikely to happen.

We are initially developing VOR33 for use in patients receiving HSCT who have been determined to be at high-risk for relapse of AML in the anticipation that VOR33 would enhance the utility and broaden the applicability of therapies subsequently deployed. A T cell therapy candidate using the same VCAR33 CAR construct is being studied by the NMDP as a monotherapy in an ongoing investigator-initiated Phase 1/2 clinical trial for the treatment of refractory/relapsed AML in a bridge-to-transplant setting, which means it is being evaluated as a second or third line therapy prior to administration of HSCT. There is no guarantee that VOR33 or any future eHSCs we may develop, even if approved, would be approved for patients who have not experienced, or are not at risk of experiencing relapse, or in combination with other lines of therapy. VCAR33 or any other companion therapeutic we may develop is not guaranteed approval as an earlier line therapy or in settings other than bridge to transplant. In addition, we may have to conduct additional large randomized clinical trials prior to or post gaining approval for use VOR33 in patients who have not experienced relapse and/or in combination with an earlier line of therapy or of VCAR33 as or in combination with a different line of treatment.

Our projections of both the number of people who have the cancers we are targeting, as well as the size of the patient population subset who are in a position to undergo HSCT, who are likely to relapse and who have the potential to benefit from treatment with eHSCs, or who are in a position to benefit from a companion therapeutic, such as VCAR33, are based on our estimates and data provided to us by third parties. These estimates have been derived from a variety of sources, including scientific literature, surveys of clinics, the NMDP, research facilities, patient foundations or market research and may prove to be incorrect. Further, new studies may change the estimated incidence or prevalence of these cancers. The number of patients may turn out to be fewer than expected.

Additionally, the potentially addressable patient population for VOR33, VCAR33, the VOR33/VCAR33 Treatment System or future product candidates we may develop may be limited, or may not be amenable to treatment with our product candidates. The addressable patient population will ultimately depend upon, among other things, the diagnosis criteria included in the final label, the availability of alternative treatments and the safety, convenience, cost and efficacy of our product candidates relative to such alternative treatments, acceptance by the medical community and patient access, drug pricing and reimbursement.

Even if we obtain significant market share for our product candidates, because the potential target populations are small, we may never achieve significant revenue without obtaining regulatory approval for additional indications or in connection with earlier lines of therapy.

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

We face an inherent risk of product liability exposure related to the testing in human clinical trials of our product candidates and will face an even greater risk if we commercially sell any products that we may develop. For example, we may be sued if our product candidates cause, or are perceived to cause, injury or are found to be otherwise unsuitable during clinical trials, manufacturing, marketing or sale. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict liability or a breach of warranties. Claims could also be asserted under state consumer protection acts. If we cannot successfully defend ourselves against claims that our product candidates or products caused injuries, we could incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- the inability to commercialize any products that we may develop.
- decreased demand for our product candidates or products that we may develop;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants;

- significant time and costs to defend the related litigation;
- substantial monetary awards to trial participants or patients; and
- loss of revenue.

Insurance coverage is increasingly expensive and we anticipate procuring clinical trial insurance with the start of our VOR33 clinical trial. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise.

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

Our product candidates require processing steps that are more complex than those required for most chemical and other biological pharmaceuticals. Moreover, unlike chemical and other biological pharmaceuticals, the physical and chemical properties of a gene-engineered cell therapy such as VOR33, VCAR33, the VOR33/VCAR33 Treatment System or future eHSCs or CAR-T or other cell-based companion therapeutics we may 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, insufficient inventory or potentially delay progression of our potential IND filings or clinical trials. 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, our product candidates will require complicated delivery modalities, such as electroporation, which will introduce additional complexities in the manufacturing process. Any of the foregoing factors could limit our ability to replicate the vein-to-vein time achieved in our preclinical manufacturing of VOR33 in a clinical or, if approved, commercial setting.

Our product candidates VOR33, VCAR33 and the VOR33/VCAR33 Treatment System consist, and any other eHSC or CAR-T or other cell-based companion therapeutics we may develop will consist, of genetically engineered human cells, and the process of manufacturing such product candidates is complex, concentrated with a limited number of suppliers, highly regulated and subject to numerous risks. Manufacturing such product candidates involves harvesting cells from a donor or from the patient, altering the cells *ex vivo* using genome engineering technology, cryopreservation, storage and eventually shipment and infusing the cell product into the patient's body. Our manufacturing process will be susceptible to product loss or failure, or product variation that may negatively impact patient outcomes, due to logistical issues associated with the collection of starting material from the donor, shipping such material to the manufacturing site, shipping the final product back to the clinical trial recipient, preparing the product for administration, infusing the patient with the product, manufacturing issues or different product characteristics resulting from the differences in donor starting materials, variations between reagent lots, interruptions in the manufacturing process, contamination, equipment or reagent failure, improper installation or operation of equipment, vendor or operator error, inconsistency in cell growth and variability in product characteristics. Our manufacturing process, like that of a number of other cell therapy companies, is also characterized by limited numbers of suppliers, and in some cases sole source suppliers, with the manufacturing capabilities and know-how to create or source the materials, such as donor marrow cells and electroporation machines, used in our cell manufacturing. While we pursue multiple sources for the critical components of our manufacturing process, we may not be successful in securing these additional sources at all or on a timely basis. 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 any of the manufacturing facilities in which products or other materials are made, such manufacturing facilities may need to be closed for an extended period of time to investigate and remedy the contamination. In addition, because VOR33 and VCAR33 are manufactured for each particular patient, we will be required to maintain a chain of identity with respect to materials as they move from the donor or patient to the manufacturing facility, through the manufacturing process and back to the clinical trial recipient. Maintaining a

chain of identity is difficult and complex, and failure to do so could result in adverse patient outcomes, loss of product or regulatory action, including withdrawal of our products from the market. Any failure in the foregoing processes could render a batch of product unusable, could affect the regulatory approval of such product candidate, could cause us to incur fines or penalties or could harm our reputation and that of our product candidates.

We may make changes to our manufacturing process for various reasons, such as to control costs, achieve scale, decrease processing time, increase manufacturing success rate or for other reasons. For example, we are beginning to develop internal GMP manufacturing capabilities to produce supplies of our cell-based therapies for our clinical trials. Changes to our process made during the course of clinical development could require us to show the comparability of the product used in earlier clinical phases or at earlier portions of a trial to the product used in later clinical phases or later portions of the trial. Other changes to our manufacturing process made before or after commercialization could require us to show the comparability of the resulting product to the product candidate used in the clinical trials using earlier processes. Such showings could require us to collect additional nonclinical or clinical data from any modified process prior to obtaining marketing approval for the product candidate produced with such modified process. If such data are not ultimately comparable to that seen in the earlier trials or earlier in the same trial in terms of safety or efficacy, we may be required to make further changes to our process and/or undertake additional clinical testing, either of which could significantly delay the clinical development or commercialization of the associated product candidate, which would materially adversely affect our business, financial condition, results of operations and growth prospects

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 VOR33 or VCAR33 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. Also, due to the short time between the collection of donor HSCs, the manufacturing of VOR33 and the shipment to a transplant center for use in HSCT, there are limited opportunities for sterility testing and we anticipate that final testing may occur just before or after the administration VOR33. Any delays in testing may delay administration of VOR33 and any administration prior to testing may result in positive bacterial tests and obligations to notify health authorities.

Any problems in our manufacturing process, including either our planned in-house manufacturing 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 internal or 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.

The process for treating cancer patients using T cell therapy or other cell-based targeted therapies is subject to human and systemic risks.

The "vein-to-vein" cycle for treating cancer patients using T cell therapy or other cell-based targeted therapies typically takes approximately four to six weeks and involves a large number of steps and human participants. First, the patient's lymphocytes are isolated by apheresis at the clinical site and shipped to the manufacturing site. Under cGMP conditions at the manufacturing site, the patient's lymphocytes are thawed and washed and then enriched for CD33-positive T cells using specialized reagents. After overnight culture and T cell activation, the T cells are transduced using lentiviral vector transduction technology to introduce the CAR genetic construct into the enriched T cell population. At the completion of T cell transduction, the T cells are harvested, formulated into the final drug product and then cryopreserved for delivery to patients. Similar procedures may be used for other cell-based targeted therapies, such as a CAR natural killer cell therapy. In the United States, samples of the final product are subjected to several release tests which must fulfill specified criteria for the drug product to be released for infusion. These include sterility, identity, purity, potency and other tests. We are subject to stringent regulatory and quality standards for the T cell therapy treatment process. We cannot offer assurances that our quality control and assurance efforts will be successful or that the risk of human or systemic errors in these processes can be eliminated.

Prior treatments can alter the cancer and negatively impact chances for achieving clinical activity with our CAR-T or other cell-based targeted therapies.

Patients with hematological cancers typically receive highly toxic chemotherapy as their initial treatments that can impact the viability of the T cells collected from the patient and may contribute to highly variable responses to CAR-T or other cell-based targeted therapies. In certain instances, we may use the allogeneic derived T cell fraction from the leukapheresis of the HLA-matched normal healthy donors as the starting material. Like the patient derived T cells, these donor-derived T cells may also display variability that will impact responses to VCAR33 or other cell-based companion therapeutics we may develop. Patients could also have received prior therapies that target the same molecule on the cancer cells as VCAR33 or other cell-based companion therapeutics we may develop and thereby these patients may have cancer cells with low or no expression of the target. As a result, VCAR33 or any other cell-based companion therapeutics we may develop may not recognize the cancer cell and may fail to achieve clinical activity. For example, AML patients could have received a BCMA-targeting antibody drug conjugate BCMA-ADC like GSK2857916, BCMA targeting T cell engagers like AMG-420 (Amgen) and CC-93269 (Bristol-Myers Squibb), or similar products or product candidates prior to receiving VCAR33 or any other cell-based companion therapeutics we may develop. If any product candidates we develop do not achieve a sufficient level of clinical activity, we may discontinue the development of that product candidate, which could have an adverse effect on the value of our common stock.

Third-party manufacturers and any third-party collaborators may be unable to successfully scale-up manufacturing of VOR33, VCAR33 or future product candidates in sufficient quality and quantity, which would delay or prevent us from developing such product candidates and commercializing approved products, if any.

In order to conduct clinical trials of VOR33, VCAR33 and any future product candidates we may develop, we may need to work with third-party manufacturers to manufacture them in sufficient quantities if we are not able to produce sufficient quantities on our own. We, or our manufacturing partners or our third-party collaborators, may be unable to successfully increase the manufacturing capacity of VOR33, VCAR33 and other future product candidates in a timely or cost-effective manner, or at all. We expect that each lot of VOR33 and VCAR33 will need to be manufactured for a specific individual patient, and each lot will need to be individually tested and released for that patient. As a result, we may experience limited production capacity and be unable to meet the need of all patients who could benefit from treatment, if approved. In addition, quality issues may arise during scale-up activities. If we or our manufacturing partners or collaborators are unable to successfully scale up the manufacture of our current or future product candidates in sufficient quality and quantity, the development, testing and clinical trials of that product candidate may be delayed or infeasible, and marketing approval or commercial launch of any resulting product may be delayed or not obtained, which could significantly harm our business.

We have not yet developed a validated methodology for freezing and thawing large quantities of eHSCs or of VCAR33, which we believe will be required for the storage and distribution of our product candidates.

We have not demonstrated that eHSCs or VCAR33, when manufactured for late stage clinical studies or at a commercial scale, can be frozen and thawed without damage in a cost-efficient manner and without degradation. We may encounter difficulties not only in developing freezing and thawing methodologies, but also in obtaining the necessary regulatory approvals for using such methodologies in treatment. If we cannot adequately demonstrate similarity of our frozen product to the unfrozen form to the satisfaction of the FDA, we could face substantial delays in our regulatory approvals. If we are unable to freeze eHSCs or VCAR33 or other cell-based companion therapeutics we may develop for shipping purposes, our ability to promote adoption and standardization of our products, as well as achieve economies of scale by centralizing production facilities, will be limited. Even if we are able to successfully freeze and thaw eHSCs or VCAR33 at commercial scale, we will still need to develop a cost-effective and reliable distribution and logistics network, which we may be unable to accomplish. For these and other reasons, we may not be able to manufacture eHSCs, VCAR33 or other cell-based companion therapeutics we may develop at commercial scale or in a cost-effective manner.

If we or any contract manufacturers and suppliers that we engage fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

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

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

In addition, we may incur substantial costs to comply with current or future environmental, health and safety laws, regulations and permitting requirements. For example, our products are considered to contain genetically modified organisms or cells, which are regulated in different ways depending upon the country in which preclinical research or clinical trials are conducted. These current or future laws, regulations and permitting requirements may impair our research, development or production efforts. Failure to comply with these laws, regulations and permitting requirements also may result in substantial fines, penalties or other sanctions or business disruption, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

Any third-party contract manufacturers and suppliers we engage will also be subject to these and other environmental, health and safety laws and regulations. Liabilities they incur pursuant to these laws and regulations

could result in significant costs or an interruption in operations, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

Risks Related to Regulatory Review

If clinical trials of VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may identify and develop fail to demonstrate safety and efficacy to the satisfaction of regulatory authorities or do not otherwise produce positive results, we may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of such product candidates.

Before obtaining marketing approval from regulatory authorities for the sale of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we identify and develop, we must complete preclinical development and then conduct extensive clinical trials to demonstrate the safety and efficacy in humans. Clinical testing is expensive, difficult to design and implement, can take many years to complete and is uncertain as to outcome. A failure of one or more clinical trials can occur at any stage of testing. The outcome of preclinical testing and early clinical trials may not be predictive of the success of later clinical trials, and interim results of a clinical trial do not necessarily predict final results.

Moreover, preclinical and clinical data are often susceptible to varying interpretations and analyses. 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 product candidates.

We and our collaborators, if any, 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 any product candidates, including:

- delays in reaching a consensus with regulators on trial design;
- regulators, IRBs, independent ethics committees or scientific review boards may not authorize us or our investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;
- delays in reaching or failing to reach agreement on acceptable clinical trial contracts or clinical trial protocols with prospective CROs, and clinical trial sites;
- clinical trials of 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 or research programs;
- difficulty in designing well-controlled clinical trials due to ethical considerations which may render it inappropriate to conduct a trial with a control arm that can be effectively compared to a treatment arm;
- difficulty in designing clinical trials and selecting endpoints for diseases that have not been well-studied and for which the natural history and course of the disease is poorly understood;
- the number of patients required for clinical trials of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop may be larger than we anticipate; enrollment of suitable participants in these clinical trials, which may be particularly challenging for some of the rare diseases we are targeting in our most advanced programs, may be delayed or slower than we anticipate; or patients 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 independent ethics committees may require that we or our investigators suspend or terminate clinical research or clinical trials for various reasons, including noncompliance with regulatory requirements, a finding of undesirable side effects or other unexpected characteristics, or that the participants are being exposed to unacceptable health risks or after an inspection of our clinical trial operations or trial sites;

- the cost of clinical trials may be greater than we anticipate;
- the supply or quality of product candidates or other materials necessary to conduct clinical trials may be insufficient or inadequate, including as a result of delays in the testing, validation, manufacturing and delivery of product candidates to the clinical sites by us or by third parties with whom we have contracted to perform certain of those functions;
- delays in having patients complete participation in a trial or return for post-treatment follow-up;
- clinical trial sites dropping out of a trial;
- selection of clinical endpoints that require prolonged periods of clinical observation or analysis of the resulting data;
- occurrence of serious adverse events associated with product candidates that are viewed to outweigh their potential benefits;
- occurrence of serious adverse events in trials of the same class of agents conducted by other sponsors;
- changes in regulatory requirements and guidance that require amending or submitting new clinical protocols; and
- disruption in the supply or availability of Mylotarg or any future companion therapeutics we use with our eHSCs.

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

- be delayed in obtaining marketing approval for any such product candidates or 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 that includes significant use or distribution restrictions or safety warnings, including boxed warnings;
- be subject to changes in the way the product is administered;
- be required to perform additional clinical trials to support approval or be subject to additional post-marketing testing requirements;
- have regulatory authorities withdraw or suspend their approval of the product or impose restrictions on its distribution in the form of a REMS or through modification to an existing REMS;
- be sued; or
- experience damage to our reputation.

Product development costs will also increase if we or our collaborators experience delays in clinical trials or other testing or in obtaining marketing approvals. We do not know whether any clinical trials will begin as planned, will need to be restructured or will be completed on schedule, or at all. Significant clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize product candidates, could allow our competitors to bring products to market before we do and could impair our ability to successfully commercialize product candidates, any of which may harm our business, financial condition, results of operations and prospects.

Even if we complete the necessary clinical trials, we cannot predict when, or if, we will obtain regulatory approval to commercialize VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product

candidate we may develop in the United States or any other jurisdiction, and any such approval may be for a more narrow indication than we seek.

We cannot commercialize a product candidate until the appropriate regulatory authorities have reviewed and approved the product candidate. Even if our product candidates meet their safety and efficacy endpoints in clinical trials, the regulatory authorities 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. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory authority policy during the period of product development, clinical trials and the review process.

Regulatory authorities also may approve a product candidate for more limited indications than requested or they may impose significant limitations in the form of narrow indications, warnings or a REMS. These regulatory authorities may require labeling that includes precautions or contra-indications with respect to conditions of use, or they may grant approval subject to the performance of costly post-marketing clinical trials. In addition, regulatory authorities may not approve the labeling claims that are necessary or desirable for the successful commercialization of our product candidates. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates and materially adversely affect our business, financial condition, results of operations and prospects.

Marketing approval by the FDA in the United States, if obtained, does not ensure approval by regulatory authorities in other countries or jurisdictions. In addition, clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country does not guarantee regulatory approval in any other country. Approval processes vary among countries and can involve additional product candidate testing and validation and additional administrative review periods. Seeking foreign regulatory approval could result in difficulties and costs for us and require additional preclinical studies or clinical trials which could be costly and time-consuming. Regulatory requirements can vary widely from country to country and could delay or prevent the introduction of our product candidates we may develop in those countries. The foreign regulatory approval process involves all of the risks associated with FDA approval. We do not have any product candidates approved for sale in any jurisdiction, including international markets, and we do not have experience in obtaining regulatory approval in international markets. If we fail to comply with regulatory requirements in international markets or to obtain and maintain required approvals, or if regulatory approvals in international markets are delayed, our target market will be reduced and our ability to realize the full market potential of our product candidates will be unrealized.

Genome engineering technology is subject to a number of challenges and risks. Because genome engineering technology is novel and the regulatory landscape that will govern VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any future product candidates we may develop is uncertain and may change, we cannot predict the time and cost of obtaining regulatory approval, if we receive it at all, for our product candidates.

Because our product candidates and technology platform involve genome engineering, we are subject to many of the challenges and risks that other genetically engineered biologics and gene therapies face, including:

- regulatory requirements or guidance regarding the requirements governing genome engineering products have changed and may continue to change in the future;
- to date, only a limited number of products that involve genome engineering have been approved globally;
- improper modulation of a gene sequence, including unintended alterations or insertion of a sequence into certain locations in a patient’s chromosomes, could lead to cancer, other aberrantly functioning cells or other diseases, as well as death;
- transient expression of the Cas9 protein could lead to patients having an immunological reaction towards those cells, which could be severe or life-threatening;

- corrective expression of a missing protein, or deletion of an existing protein, in patients' cells could result in the protein or cell being recognized as foreign, and lead to a sustained immunological reaction against the expressed protein or expressing cells, which could be severe or life-threatening;
- regulatory agencies may require extended follow-up observation periods of patients who receive treatment using genome engineering products including, for example, the FDA's recommended 15-year follow-up observation period for these patients, and we will need to adopt such observation periods for our product candidates if required by the relevant regulatory agency, which could vary by country or region; and
- the field of genome engineering is subject to a number of intellectual property disputes.

The regulatory requirements that will govern VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other novel genetically engineered product candidates we develop are not entirely clear and may change. Within the broader genetic medicine 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 ("OTAT") within its Center for Biologics Evaluation and Research ("CBER") to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its review. In addition to FDA oversight and oversight by IRBs under guidelines promulgated by the NIH, gene therapy clinical trials are also subject to review and oversight by an institutional biosafety committee ("IBC"), a local institutional committee that reviews and oversees research utilizing recombinant or synthetic nucleic acid molecules at that institution. Before a clinical study can begin at any institution, that institution's IRB and its IBC assesses the safety of the research and identifies any potential risk to public health or the environment. While the NIH guidelines are not mandatory unless the research in question is being conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH guidelines voluntarily follow them. Moreover, serious adverse events or developments in clinical trials of gene therapy product candidates conducted by others may cause the FDA or other regulatory bodies to initiate a clinical hold on our clinical trials or otherwise change the requirements for approval of any of our product candidates. 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. 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 European Union. The EMA's Committee for Advanced Therapies ("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 cell or gene therapy or other novel therapeutic medicinal candidate that is submitted to the Committee for Medicinal Products for Human Use ("CHMP") before CHMP adopts its final opinion. In the European Union, the development and evaluation of an advanced therapeutic medicinal product must be considered in the context of the relevant European Union guidelines. The EMA may issue new guidelines concerning the development and marketing authorization for these medicinal products and require that we comply with these new guidelines. As a result, the procedures and standards applied to gene and cell therapy products may be applied to VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other 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 genome engineering technology may cause the FDA, the EMA and other regulatory bodies to revise the requirements for development or approval of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop or limit the use of products utilizing genome engineering 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 VOR33 and VCAR33, 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 genome engineering 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 product candidate development, 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. Currently, OTAT requires a 15-year follow-up for each patient who receives a genetically engineered cell or gene therapy. This applies to all patients treated in trials during clinical development prior to approval. Following approval, such prolonged follow-up could continue to be required. As we advance our product candidates and research programs, 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 VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we identify and develop.

Because we are developing product candidates using new technologies, as well as potential mechanisms of action for which there are few precedents, 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.

The FDA, EMA and other regulatory authorities typically assess the safety and efficacy of a product with sufficient data to justify marketing authorization. We expect that VOR33 and any other eHSC product candidates we develop will not, by themselves, provide any anti-tumor activity in patients that relapse after HSCT, and that our eHSCs could be effective after patients relapse only when administered in combination or sequence with other therapies. There are few precedents for product candidates with this potential mechanism of action. Furthermore, we are employing genome engineering technologies in the creation of our eHSCs that have not yet been clinically validated. 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 VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop. As we are initially seeking to identify and develop product candidates to treat diseases using novel methods of action and new technologies, 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 European Union and other countries may make similar comments with respect to these endpoints and data. VOR33 and VCAR33 are, and any other 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.

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

From time to time, we may publish interim top-line or preliminary results from our preclinical studies and clinical trials, which are based on a preliminary analysis of then-available data, and the results and related findings and conclusions are subject to change following a more comprehensive review of the data related to the particular study or trial. 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 patient enrollment continues and more patient data become available. 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. Differences between preliminary or interim data and final data could significantly harm our business prospects and may cause the trading price of our common stock to fluctuate significantly.

Further, others, including regulatory agencies, may not accept or agree with our assumptions, estimates, calculations, conclusions or analyses or may interpret or weigh the importance of data differently, which could impact the value of the particular program, the approvability or commercialization of the particular product candidate or product and our company in general. In addition, the information we choose to publicly disclose regarding a particular study or clinical trial is based on what is typically extensive information, and investors or others may not agree with what we determine is material or otherwise appropriate information to include in our disclosure, and any information we determine not to disclose may ultimately be deemed significant with respect to future decisions, conclusions, views, activities or otherwise regarding a particular product, product candidate or our business. If the interim, topline or preliminary data that we report differ from actual results, or if others, including regulatory authorities, disagree with the conclusions reached, our ability to obtain approval for, and commercialize, our product candidates may be harmed, which could harm our business, operating results, prospects or financial condition.

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

Patient enrollment is a significant factor in the timing of clinical trials. The timing of our clinical trials depends, in part, on the speed at which we can recruit patients to participate in our trials. We or our collaborators may not be able to initiate or continue clinical trials for VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we identify or develop if we are unable to locate and enroll a sufficient number of eligible patients to participate in these trials as required by the FDA, the EMA or other analogous regulatory authorities outside the United States, or as needed to provide appropriate statistical power for a given trial. Patients may be unwilling to participate in our clinical trials because of negative publicity from adverse events related to the biotechnology, gene therapy or genome engineering fields, competitive clinical trials for similar patient populations, clinical trials in competing products or for other reasons. As a result, the timeline for recruiting patients, conducting trials and obtaining regulatory approval of product candidates be delayed.

Patient enrollment is also affected by other factors, including:

- severity of the disease under investigation;
- size of the patient population and process for identifying patients;
- design of the trial protocol;
- availability and efficacy of approved medications for the disease under investigation;
- availability of genetic testing for potential patients;
- ability to obtain and maintain patient informed consent;
- risk that enrolled patients will drop out before completion of the trial;
- eligibility and exclusion criteria for the trial in question;
- perceived risks and benefits of the product candidate under trial;
- perceived risks and benefits of genome engineering as a treatment approach;
- perceived risks and benefits of the companion therapeutics that may be administered in combination or in sequence with VOR33;

- efforts to facilitate timely enrollment in clinical trials;
- potential disruptions caused by the COVID-19 pandemic, including difficulties in initiating clinical sites, enrolling and retaining participants, diversion of healthcare resources away from clinical trials, travel or quarantine policies that may be implemented, and other factors;
- patient referral practices of physicians;
- ability to monitor patients adequately during and after treatment;
- proximity and availability of clinical trial sites for prospective patients, especially for those conditions which have small patient pools;
- the requirement for HSCT to be performed in centers that specialize in this procedure; and
- changes to diagnostic technologies, methodologies or criteria used to identify HSCT patients at high risk for relapse.

Enrollment delays in our clinical trials may result in increased development costs for VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop, which would cause the value of our company to decline and limit our ability to obtain additional financing. If we or our collaborators have difficulty enrolling a sufficient number of patients to conduct our clinical trials as planned, we may need to delay, limit or terminate ongoing or planned clinical trials, any of which would have an adverse effect on our business, financial condition, results of operations and prospects.

If we are unable to successfully identify patients who are likely to benefit from our product candidates, or experience significant delays in doing so, we may not realize the full commercial potential of VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop.

VOR33 and any other eHSCs we may develop will require identification of patients that are likely to benefit from administration of our genetically engineered cells in combination with a companion therapeutic. In addition, VCAR33 and any other companion therapeutic we develop will require identification of patients with myeloid malignancies that express specific surface targets. If we, or any third parties that we engage to assist us, are unable to successfully identify such patients or experience delays in doing so, then:

- our ability to develop any product candidates may be adversely affected if we are unable to appropriately select patients for enrollment in our clinical trials; and
- we may not realize the full commercial potential of any product candidates we develop that receive marketing approval if, among other reasons, we are unable to appropriately select patients who are likely to benefit from administration of our genetically engineered cells.

Any product candidates we develop may require use of a companion diagnostic to identify patients who are likely to benefit from genetically engineered cell treatment. If safe and effective use of any of our product candidates depends on a companion diagnostic, we may not receive marketing approval, or marketing approval may be delayed, if we are unable to or are delayed in developing, identifying or obtaining regulatory approval or clearance for the companion diagnostic product for use with our product candidate. Identifying a manufacturer of the companion diagnostic and entering into an agreement with the manufacturer could also delay the development of our product candidates.

As a result of these factors, we may be unable to successfully develop and realize the commercial potential of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may identify and develop, and our business, financial condition, results of operations and prospects would be materially adversely affected.

We may seek Fast Track designation for some or all of our product candidates. We may not receive such designation, and even for those product candidates for which we do, it may not lead to a faster development or

regulatory review or approval process, and will not increase the likelihood that product candidates will receive marketing approval.

We may seek Fast Track designation and review for some or all of our other product candidates. If a drug or biologic is intended for the treatment of a serious or life-threatening condition or disease, and nonclinical or clinical data demonstrate the potential to address an unmet medical need, the product may qualify for FDA fast track designation, for which sponsors must apply. The FDA has broad discretion whether or not to grant this designation. Thus, even if we believe a particular product candidate is eligible for this designation, the FDA may decide not to grant it. Moreover, even if we do receive Fast Track designation, we or our collaborators may not experience a faster development process, review or approval compared to conventional FDA procedures. In addition, the FDA may withdraw Fast Track designation if it believes that the designation is no longer supported by data from our clinical development program.

Risks Related to Our Relationships with Third Parties

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

We rely on third parties to conduct some aspects of our research and preclinical testing, and we expect to rely on third parties, such as CROs, clinical data management organizations, medical institutions such as HSCT centers, and clinical investigators, to conduct our clinical trials. Any of these third parties may terminate their engagements with us at any time under certain criteria. If we need to enter into alternative arrangements, it may delay our product development activities.

Our reliance on these third parties for research and development and clinical activities will reduce our control over these activities but will not relieve us of our responsibilities. For example, we will remain responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial. Moreover, the FDA, EMA and other regulatory authorities require us to comply with standards, commonly referred to as Good Clinical Practices, for conducting, recording and reporting the results of clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of trial participants are protected. In the United States, we also are required to register ongoing clinical trials and post the results of completed clinical trials on a government-sponsored database, ClinicalTrials.gov, within certain timeframes. Failure to do so can result in fines, adverse publicity and civil and criminal sanctions.

Although we intend to design the future clinical trials for VOR33, VCAR33, the VOR33/VCAR33 Treatment System and other 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 our product candidates 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.

Moreover, principal investigators for our clinical trials may serve as scientific advisors or consultants to us from time to time and receive compensation in connection with such services. Under certain circumstances, we may be required to report some of these relationships to the FDA or comparable foreign regulatory authorities. The FDA or comparable foreign regulatory authority may conclude that a financial relationship between us and a principal investigator has created a conflict of interest or otherwise affected interpretation of the trial. The FDA or comparable foreign regulatory authority may therefore question the integrity of the data generated at the applicable clinical trial site and the utility of the clinical trial itself may be jeopardized. This could result in a delay in approval, or rejection, of our marketing applications by the FDA or comparable foreign regulatory authority, as the case may be, and may ultimately lead to the denial of marketing approval of our product candidates.

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

We contract with third parties for the manufacture and supply of materials for development of our product candidates and advancement of our current clinical trial, as well as our research programs and preclinical studies, and we expect to continue to do so for future clinical trials and for commercialization of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop. This reliance on third parties increases the risk that we will not have sufficient quantities of such materials, product candidates or any products that we may develop and commercialize, or that such supply will not be available to us at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts.

We do not have any manufacturing facilities at the present time. We currently rely on third-party manufacturers, pharmaceutical companies and marrow donor programs, including certain single source suppliers, for the manufacture and supply of our materials for preclinical studies, and expect to continue to do so for future clinical testing and for commercial supply of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates that we may develop and for which we or our collaborators obtain marketing approval. We do not have a long-term agreement with many of these third-party manufacturers or suppliers, and we frequently purchase our required supply on a purchase order basis. We may be unable to establish any agreements with third-party manufacturers or suppliers or to do so on acceptable terms. Even if we are able to establish agreements with third-party manufacturers or suppliers, reliance on third-party manufacturers entails additional risks, including:

- the possible breach of the manufacturing or supply agreement by the third party;
- the possible termination or nonrenewal of the agreement by the third party at a time that is costly or inconvenient for us; and
- reliance on the third party for regulatory compliance, quality assurance, safety and pharmacovigilance and related reporting.

Third-party manufacturers may not be able to comply with cGMP regulations or similar regulatory requirements outside the United States. Our failure, or the failure of our third-party manufacturers or suppliers, to comply with applicable regulations could result in sanctions being imposed on us, including fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocations, 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 and harm our business, financial condition, results of operations and prospects.

Our product candidates may compete with other product candidates and products for access to manufacturing facilities and other supplies. There are a limited number of manufacturers that operate under cGMP regulations and that might be capable of manufacturing for us. Also, prior to the approval of our product candidates, we would need to identify a contract manufacturer that could produce our products at a commercial scale and that could successfully complete FDA pre-approval inspection and inspections by other health authorities. Agreements with such manufacturers or suppliers may not be available to us at the time we would need to have that capability and capacity.

Any performance failure on the part of our existing or future manufacturers or suppliers, or any decision by a manufacturer or supplier to remove its products from the market or restrict access to its products, could delay clinical development or marketing approval. We do not currently have arrangements in place for redundant or guaranteed supply for many of the materials we currently use in our preclinical studies and expect to use in our clinical development programs, including for the supply of Mylotarg, donor blood cells, certain apheresis reagents and electroporation machines, and we may have difficulty or be unable to establish alternative sources of these materials. In addition, if any of the manufacturers with whom we have a contractual agreement cannot perform as agreed, we may be required to replace that manufacturer. Although we believe that there are several potential alternative manufacturers who could replace our contract manufacturers, we may incur added costs and delays in identifying and qualifying any such replacement.

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

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

We may seek third-party collaborators for the research, development and commercialization of certain product candidates we may develop. If we enter into any such arrangements with any third parties, we will likely have limited control over the amount and timing of resources that our collaborators dedicate to the development or commercialization our product candidates. Our ability to generate revenues from these arrangements will depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements. We cannot predict the success of any collaboration that we enter into.

Collaborations involving our current or future product candidates or research programs pose numerous risks to us, including the following:

- Collaborators have significant discretion in determining the efforts and resources that they will apply to these collaborations.
- Collaborators may not pursue development and commercialization of our product candidates or may elect not to continue or renew development or commercialization programs based on clinical trial results, changes in the collaborator's strategic focus or available funding or external factors such as an acquisition that diverts resources or creates competing priorities.
- Collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials or require a new formulation of a product candidate for clinical testing.
- Collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our product candidates if the collaborators believe that competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours.
- Collaborators with marketing and distribution rights to one or more products may not commit sufficient resources to the marketing and distribution of such products.

- Collaborators may not properly obtain, maintain, enforce or defend our intellectual property or proprietary rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our proprietary information or expose us to potential litigation.
- Disputes may arise between the collaborators and us that result in the delay or termination of the research, development or commercialization of our products or product candidates or that result in costly litigation or arbitration that diverts management attention and resources.
- We may lose certain valuable rights under circumstances identified in our collaborations, including if we undergo a change of control.
- Collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable product candidates we may develop.
- Collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner or at all. If a present or future collaborator of ours were to be involved in a business combination, the continued pursuit and emphasis on our product development or commercialization program under such collaboration could be delayed, diminished or terminated.

If our collaborations do not result in the successful development and commercialization of product candidates, 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 product candidates could be delayed, and we may need additional resources to develop product candidates. In addition, if one of our collaborators terminates its agreement with us, we may find it more difficult to find a suitable replacement collaborator or attract new collaborators, and our development programs may be delayed or the perception of us in the business and financial communities could be adversely affected. All of the risks relating to product development, regulatory approval and commercialization described in this Annual Report apply to the activities of our collaborators.

These relationships, or those like them, 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. In addition, 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 VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we 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.

If we are not able to establish collaborations on commercially reasonable terms, we may have to alter our development and commercialization plans.

Our product development and research programs and the potential commercialization of VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop will require substantial additional cash to fund expenses. For some of the product candidates we may develop, we may decide to collaborate with other pharmaceutical and biotechnology companies for the development and potential commercialization of those product candidates.

We would face significant competition in seeking appropriate collaborators. 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, the EMA or similar regulatory authorities outside the United States, 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, and industry and

market conditions generally. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available to collaborate on and whether such a collaboration could be more attractive than the one with us.

We may also be restricted under existing collaboration agreements from entering into future agreements on certain terms with potential collaborators. Collaborations are complex and time-consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators.

We may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of the product candidate for which we are seeking to collaborate, 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 increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to develop product candidates or bring them to market and generate product revenue.

Risks Related to Our Intellectual Property

We are highly dependent on intellectual property licensed from third parties and termination of any of these licenses could result in the loss of significant rights, which would harm our business.

In April 2016, we entered into a license agreement with The Trustees of Columbia University in the City of New York ("Columbia") pursuant to which we were granted an exclusive, worldwide license to certain intellectual property rights owned or controlled by Columbia, including patents, patent applications, proprietary information, know-how and other intellectual property related to the inhibition of lineage-specific antigens, to develop, commercialize and sell one or more products in any field of use, including related to eHSCs.

In addition, in October 2020, we entered into a license agreement with the National Cancer Institute ("NCI"), pursuant to which we were granted an exclusive, worldwide license to certain intellectual property rights owned or controlled by NCI, including patents, patent applications, proprietary information, know-how and other intellectual property related to anti-CD33 CAR-T therapies, to develop, commercialize and sell one or more products for the prophylaxis or treatment of CD33-expressing hematological malignancies, including AML and other myeloid malignancies.

We are dependent on the patents, know-how and proprietary technology, licensed from Columbia and NCI for the development and, if approved, commercialization of VOR33 and VCAR33, respectively. Any termination of these licenses, or a finding that such intellectual property lacks legal effect, could result in the loss of significant rights and could harm our ability to commercialize our current or future product candidates.

Each of the Columbia license agreement and the NCI license agreement imposes certain obligations on us, including obligations to use diligent efforts to meet development thresholds and payment obligations. Non-compliance with such obligations may result in termination of the respective license agreement or in legal and financial consequences. If either Columbia or NCI terminates its respective license agreement, we may not be able to develop, commercialize or sell VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates covered by these agreements. Such an occurrence could materially adversely affect the value of the product candidate being developed under any such agreement or using rights granted under such agreement. Termination of our license agreements or reduction or elimination of our rights under them may result in our having to negotiate a new or reinstated agreement, which may not be available to us on equally favorable terms, or at all, which may mean we are unable to develop, commercialize or sell the affected product candidate or may cause us to lose our rights under the agreement.

In addition, our licensors may make decisions in prosecuting, maintaining, enforcing and defending any licensed intellectual property rights, for example, any licensed patents or patent applications, that may not be in our

best interest. Moreover, if our licensors take any action with respect to any licensed intellectual property rights, for example, any licensed patents or patent applications, that results in a successful challenge to the licensed intellectual property by a third party, such patents may be invalidated or held to be unenforceable, and we may lose our rights under such patents, which could materially harm our business.

Further, the agreements under which we currently license intellectual property from third parties are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. Accordingly, disputes may arise between us and our licensors regarding intellectual property subject to a license agreement, including those relating to:

- the scope of rights, if any, granted under the license agreement and other interpretation-related issues;
- whether and the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the license agreement;
- whether our licensor or its licensor had the right to grant the license agreement;
- whether third parties are entitled to compensation or equitable relief, such as an injunction, for our use of the intellectual property without their authorization;
- our right to sublicense patent and other rights to third parties under collaborative development relationships;
- whether we are complying with our obligations with respect to the use of the licensed technology in relation to our development and commercialization of product candidates;
- our involvement in the prosecution and enforcement of the licensed patents and our licensors' overall patent prosecution and enforcement strategy;
- the allocation of ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and by us and any future partners or collaborators; and
- the amounts of royalties, milestones or other payments due under the license agreement.

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.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, or are insufficient to provide us the necessary rights to use the intellectual property, we may be unable to successfully develop and commercialize the affected product candidates.

If we or any of our licensors fail to adequately protect this intellectual property, our ability to commercialize our products could suffer. Any disputes with our licensors or any termination of the licenses on which we depend could have a material adverse effect on our business, financial condition, results of operations and prospects.

Our commercial success depends on our ability to obtain, maintain and protect our intellectual property and proprietary technology.

Our commercial success depends in large part on our ability to obtain, maintain and protect intellectual property rights through patents, trademarks and trade secrets in the United States and other countries with respect to our proprietary product candidates. If we do not adequately protect our intellectual property rights, competitors may be able to erode, negate or preempt any competitive advantage we may have, which could harm our business and ability to achieve profitability.

To protect our proprietary position, we own and have in-licensed certain intellectual property rights, including certain issued patents and patent applications, and have filed and may file provisional and non-provisional patent applications in the United States or abroad related to our product candidates that are important to our

business. Provisional patent applications are not eligible to become issued patents until, among other things, we file a non-provisional patent application within 12 months of the filing of one or more of our related provisional patent applications. If we do not timely file non-provisional patent applications, we may lose our priority date with respect to our provisional patent applications and any patent protection on the inventions disclosed in our provisional patent applications. While we intend to timely file non-provisional patent applications relating to our provisional patent applications, we cannot predict whether any such patent applications will result in the issuance of patents that provide us with any competitive advantage. Moreover, the patent application and approval process is expensive and time-consuming. We may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner.

The patent application, prosecution, and enforcement processes are subject to numerous risks and uncertainties, and there can be no assurance that we, our licensors, or any of our future collaborators will be successful in protecting our product candidates by obtaining, defending, and/or asserting patent rights. These risks and uncertainties include the following:

- the USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other provisions during the patent process. There are situations in which noncompliance can result in abandonment or lapse of a patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, competitors might be able to enter the market earlier than would otherwise have been the case;
- patent applications may not result in any patents being issued;
- patents that may be issued or in-licensed may be challenged, invalidated, modified, revoked, circumvented, found to be unenforceable or otherwise may not provide any competitive advantage;
- our competitors, many of whom have substantially greater resources and many of whom have made significant investments in competing technologies, may seek or may have already obtained patents that will limit, interfere with or eliminate our ability to make, use, and sell our potential product candidates;
- there may be significant pressure on the U.S. government and international governmental bodies to limit the scope of patent protection both inside and outside the United States for disease treatments that prove successful, as a matter of public policy regarding worldwide health concerns; and
- countries other than the United States may have patent laws less favorable to patentees than those upheld by U.S. courts, allowing foreign competitors a better opportunity to create, develop and market competing product candidates.

In some instances, agreements through which we license intellectual property rights may not give us control over patent prosecution or maintenance, so that we may not be able to control which claims or arguments are presented, how claims are amended, and may not be able to secure, maintain, or successfully enforce necessary or desirable patent protection from those patent rights. We have not had and do not have primary control over patent prosecution and maintenance for certain of the patents and patent applications we license, including under our license agreements with Columbia and NCI, and therefore cannot guarantee that these patents and applications will be prosecuted or maintained in a manner consistent with the best interests of our business. We cannot be certain that patent prosecution and maintenance activities by our licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents.

Moreover, some of our in-licensed patents and patent applications may be, and some of our future owned and licensed patents may be, co-owned with third parties. 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.

The patent protection we obtain for our product candidates may not be sufficient to provide us with any competitive advantage or our patents may be challenged.

Our owned and licensed patents and pending patent applications, if issued, may not provide us with any meaningful protection or may not prevent competitors from designing around our patent claims to circumvent our patents by developing similar or alternative technologies or therapeutics in a non-infringing manner. For example, a third party may develop a competitive product that provides benefits similar to one or more of our product candidates but falls outside the scope of our patent protection or license rights. If the patent protection provided by the patents and patent applications we hold or pursue with respect to our product candidates is not sufficiently broad to impede such competition, our ability to successfully commercialize our product candidates could be negatively affected, which would harm our business. Currently, a significant portion of our patents and patent applications are in-licensed, though similar risks would apply to any patents or patent applications that we now own or may own or in-license in the future.

It is possible that defects of form in the preparation or filing of our patents or patent applications may exist, or may arise in the future, for example with respect to proper priority claims, inventorship, claim scope, or requests for patent term adjustments. If we or our partners, collaborators, licensees, or licensors, whether current or future, fail to establish, maintain or protect such patents and other intellectual property rights, such rights may be reduced or eliminated. If our partners, collaborators, licensees, or licensors, are not fully cooperative or disagree with us as to the prosecution, maintenance or enforcement of any patent rights, such patent rights could be compromised. If there are material defects in the form, preparation, prosecution, or enforcement of our patents or patent applications, such patents may be invalid and/or unenforceable, and such applications may never result in valid, enforceable patents. Any of these outcomes could impair our ability to prevent competition from third parties, which may have an adverse impact on our business.

In addition, the determination of patent rights with respect to clinical compositions of matter and treatment methods commonly involves complex legal and factual questions, which are dependent upon the current legal and intellectual property context, extant legal precedent and interpretations of the law by individuals. As a result, the issuance, scope, validity, enforceability and commercial value of our patent rights are characterized by uncertainty.

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 or narrow the scope of our patent protection. In addition, the laws of foreign countries may not protect our rights to the same extent or in the same manner as the laws of the United States. For example, patent laws in various jurisdictions, including significant commercial markets such as Europe, restrict the patentability of methods of treatment of the human body more than U.S. law does. If these changes were to occur, they could have a material adverse effect on our ability to generate revenue.

Pending patent applications cannot be enforced against third parties practicing the technology claimed in such applications unless and until a patent issues from such applications. Assuming the other requirements for patentability are met, currently, the first party to file a patent application is generally entitled to the patent. However, prior to March 16, 2013, in the United States the first party to invent was entitled to the patent. Publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are not published until 18 months after filing, or in some cases not at all. Therefore, we cannot be certain that we were the first to make the inventions claimed in our patents or pending patent applications, or that we were the first to file for patent protection of such inventions. Similarly, we cannot be certain that parties from whom we do or may license or purchase patent rights were the first to make relevant claimed inventions, or were the first to file for patent protection for them. If third parties have filed prior patent applications on inventions claimed in our patents or applications that were filed on or before March 15, 2013, an interference proceeding in the United States can be initiated by such third parties to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. If third parties have filed such prior applications after March 15, 2013, a derivation proceeding in the United States can be initiated by such third parties to determine whether our invention was derived from theirs.

Moreover, because the issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, our owned and licensed patents or pending patent applications may be challenged in the courts or patent offices in the United States and abroad. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found. If such prior art exists, it may be used to invalidate a patent, or may prevent a patent from issuing from a pending patent application. For example, such patent filings may be subject to a third-party submission of prior art to the U.S. Patent and Trademark Office (the "USPTO"), or to other patent offices around the world. Alternately or additionally, we may become involved in post-grant review procedures, oppositions, derivation proceedings, ex parte reexaminations, inter partes review, supplemental examinations, or interference proceedings or challenges in district court, in the United States or in various foreign patent offices, including both national and regional, challenging patents or patent applications in which we have rights, including patents on which we rely to protect our business. An adverse determination in any such challenges may result in loss of the patent or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, or in denial of the patent application or loss or reduction in the scope of one or more claims of the patent application, any of 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 products. In addition, 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.

Issued patents that we have or may obtain or license may not provide us with any meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. Our competitors may be able to circumvent our patents by developing similar or alternative technologies or products in a non-infringing manner. Our competitors may also seek approval to market their own products similar to or otherwise competitive with our products. Alternatively, our competitors may seek to market generic versions of any approved products, for example, by submitting a Section 351(k) BLA to the FDA, or pursue similar strategies in the United States or other jurisdictions, in which they claim that patents owned or licensed by us are invalid, unenforceable or not infringed. In these circumstances, we may need to defend or assert our patents, or both, including by filing lawsuits alleging patent infringement. In any of these types of proceedings, a court or other agency with jurisdiction may find our patents invalid or unenforceable, or that our competitors are competing in a non-infringing manner. Thus, even if we have valid and enforceable patents, these patents still may not provide protection against competing products or processes sufficient to achieve our business objectives. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects.

Other parties have developed or may develop technologies that may be related to or competitive with our approach, and may have filed or may file patent applications and may have been issued or may be issued patents with claims that overlap or conflict with our patent applications, either by claiming the same materials, formulations or methods, or by claiming subject matter that could dominate our patent position. In addition, certain parts or all of the patent portfolios licensed to us are, or may be, licensed to third parties and such third parties may have or may obtain certain enforcement rights. If the scope of the patent protection we or our licensors obtain is not sufficiently broad, we may not be able to prevent others from developing and commercializing technology and products similar or identical to ours. The degree of patent protection we require to successfully compete in the marketplace may be unavailable or severely limited in some cases and may not adequately protect our rights or permit us to gain or keep any competitive advantage. We cannot provide any assurances that any of our licensed patents have, or that any of our pending owned or licensed patent applications that mature into issued patents will include, claims with a scope sufficient to protect our product candidates or otherwise provide any competitive advantage, nor can we provide any assurance that our licenses will remain in force.

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

In addition to the protection afforded by patents, we rely upon trade secret protection, know-how and continuing technological innovation to develop and maintain our competitive position. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our contractors, collaborators, scientific advisors, employees and consultants and invention assignment agreements with our consultants and employees. However, we may not obtain these agreements in all circumstances, and individuals with whom we have these agreements may not comply with their terms. The assignment of intellectual property rights

under these agreements may not be self-executing or the assignment agreements may be breached, and we may be forced to bring claims against third parties, or defend claims that they may bring against us, to determine the ownership of what we regard as our intellectual property. In addition, we may not be able to prevent the unauthorized disclosure or use of our technical know-how or other trade secrets by the parties to these agreements despite the existence of confidentiality agreements and other contractual restrictions. Monitoring unauthorized uses and disclosures is difficult and we do not know whether the steps we have taken to protect our proprietary technologies will be effective. If any of the contractors, collaborators, scientific advisors, employees and consultants who are parties to these agreements breaches or violates the terms of any of these agreements, we may not have adequate remedies for any such breach or violation. As a result, we could lose our trade secrets. Enforcing a claim against a third party that illegally obtained and is using our trade secrets, like patent litigation, is expensive and time-consuming and the outcome is unpredictable. In addition, courts outside the United States are sometimes less willing or unwilling to protect trade secrets. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Moreover, our trade secrets could otherwise become known or be independently discovered by our competitors or other third parties. Competitors and other third parties could attempt to replicate some or all of the competitive advantages we derive from our development efforts, willfully infringe our intellectual property rights, design around our protected technology or develop their own competitive technologies that fall outside of our intellectual property rights. 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 our trade secrets are not adequately protected or sufficient to provide an advantage over our competitors, our competitive position could be adversely affected, as could our business. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating our trade secrets.

We may not be successful in acquiring or in-licensing necessary rights to key technologies underlying VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any future product candidates we may develop.

We currently have rights to intellectual property, through licenses from third parties, to develop VOR33, VCAR33, the VOR33/VCAR33 Treatment System and other eHSCs, and we expect to seek to expand our intellectual property footprint related to our product candidate pipeline in part by in-licensing the rights to key technologies. The future growth of our business will depend in part on our ability to in-license or otherwise acquire the rights to develop additional product candidates and technologies. Although we have succeeded in licensing technologies from third party licensors, including Columbia and NCI, in the past, we can give no assurance that we will be able to in-license or acquire the rights to other technologies relevant to our product candidates from third parties on acceptable terms or at all.

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, it may be unclear who owns the rights to intellectual property we wish to obtain, or we may be unable to secure such licenses or otherwise acquire or in-license intellectual property rights from third parties that we identify as necessary for product candidates we may develop and technology we employ. For example, we employ a range of genome engineering technologies that are owned by third parties in our preclinical studies, as well as to manufacture the supply of eHSCs or other cell therapies used for clinical trials and, if approved, for commercialization of our product candidates. In particular, we rely on, and will continue to rely on, CRISPR-Cas9 genome engineering technology to create VOR33. We currently conduct our preclinical research and clinical trials under 35 U.S.C. § 271(e)(1), which provides a safe harbor from patent infringement for uses of patented technology reasonably related to the development and submission of information under a federal law which regulates the manufacture, use, or sale of drugs. However, prior to commercializing any product candidates that rely on genome engineering technology owned by third parties, including VOR33, we will be required to obtain a license to that technology covering our field of use. While genome engineering technology licenses, including for the CRISPR-Cas9 technology, have a very limited history, we believe companies typically secure commercial licenses for these technologies in the later stages of clinical development, in anticipation of the expiration of the safe harbor under federal law. While we are aware of both exclusive and non-exclusive licenses being granted for these technologies, we are not aware of any exclusive licenses covering the engineering of eHSCs. However, it is possible

that such licenses exist, or will be granted to third parties in the future, and we may be unable to secure a license for our field of use on commercially reasonable terms or at all.

Numerous patents and patent applications directed to genome engineering technology have been filed by third parties. For example, we are aware of a number of patents and patent applications by the University of California, the University of Vienna, and Emmanuelle Charpentier; the Broad Institute, Inc. (the "Broad Institute"); the Massachusetts Institute of Technology; the Presidents and Fellows of Harvard College; Sigma-Aldrich Co.; Novartis AG; Vilnius University; Agilent Technologies, Inc.; Cellectis; Sangamo Therapeutics, Inc; The Trustees of Princeton University; Miltenyi Biotec GmbH ("Miltenyi"); Amgen Research (Munich) GmbH; and the University of Pennsylvania, among others. The intellectual property space related to genome engineering, particularly with respect to CRISPR-Cas9, is highly complex and still unsettled. For example, certain CRISPR-Cas9 patents of the University of California and the Broad Institute are currently subject to interference proceedings before the USPTO and opposition proceedings before the European Patent Office. It is uncertain when and how the USPTO as well as the European Patent Office will decide in the various proceedings, and the decisions of the respective patent offices may significantly affect the scope or may deny the validity of the respective patents involved in these proceedings. At the time we attempt to obtain a license to genome engineering technology, including to CRISPR-Cas9 technology, it may be unclear which parties own the rights to this technology, and we may be required to obtain licenses from more than one party, or from different parties in different parts of the world. In certain scenarios, it may also be difficult or impossible, at least for a certain time, to identify whether a license, if available at all, would convey sufficient intellectual property rights to us that would allow us to avoid third-party claims of intellectual property infringement, misappropriation or other violations.

The licensing or acquisition of third party intellectual property rights is a highly competitive area, and other companies may pursue strategies to license or acquire third party intellectual property rights that we may consider attractive or necessary. Such companies may have a competitive advantage over us, e.g., 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.

Even if we were able to obtain such 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. 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 product candidates or such commercialization efforts may be significantly delayed, which could in turn significantly harm our business.

Third-party claims of intellectual property infringement, misappropriation or other violations may prevent or delay our product discovery and development efforts and have a material adverse effect on our business.

Our commercial success depends in part on our avoiding infringement, misappropriation and other violations of the patents and proprietary rights of third parties. There is a substantial amount of litigation involving patents and other intellectual property rights in the biotechnology and pharmaceutical industries, as well as administrative proceedings for challenging patents, including interference and reexamination proceedings before the USPTO or oppositions and other comparable proceedings in foreign jurisdictions. Recently, under U.S. patent reform, new procedures including *inter partes* review and post grant review have been implemented. This reform will bring uncertainty to the possibility of challenge to our patents in the future. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing our product candidates, and third parties may allege they have patent rights encompassing our product candidates, technologies or methods. Third parties may assert that we are employing their proprietary technology without authorization and may file patent infringement claims or lawsuits against us, and if we are found to infringe such third-party patents, we may be required to pay damages, cease commercialization of the infringing technology or obtain a license from such third parties, which may not be available on commercially reasonable terms or at all.

We are aware of several third-party patents and patent applications that if issued, may be construed to cover eHSC technology. For example, Miltenyi's European patent EP3025719 covers technology related to eHSC products. This patent was subject to opposition proceedings before the European Patent Office Opposition Division (the "Opposition Division") and in March 2021, the Opposition Division revoked the patent. However, the decision may be appealed and, if appealed, when or in what manner the Board of Appeals of the European Patent Office will act on the appeal is not clear. In addition, the University of Pennsylvania has filed patent applications and has been granted at least one U.S. patent covering eHSC technology. These or other third parties owning or controlling patent rights may seek to allege that our development and commercialization of our eHSC products, including VOR33, infringes such patent rights and file a patent infringement lawsuit against us in the future. While we believe that we have valid defenses against any such allegation or lawsuit, such defenses may ultimately be unsuccessful.

There may also be third-party patents of which we are currently unaware with patent rights to materials, formulations, methods of manufacture or methods of 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 which 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. Further, we or our licensors may fail to identify even those relevant third-party patents that have issued or may incorrectly interpret the relevance, scope or expiration of such patents. The scope of a patent claim is determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history. Our interpretation of the relevance or scope of a patent or a pending application may be incorrect. If any third-party patents were held by a court of competent jurisdiction to cover the manufacturing process of our product candidates, materials used in or formed during the manufacturing process or any final product itself, the holders of any such patents may be able to block our ability to commercialize the product candidate unless we obtained a license under the applicable patents, or until such patents expire or they are finally determined to be held invalid or unenforceable. Similarly, if any third-party patent were held by a court of competent jurisdiction to cover aspects of our materials, formulations or methods, including without limitation, combination therapy or patient selection methods, the holders of any such patent may be able to block our ability to develop and commercialize the product candidate unless we obtained a license or until such patent expires or is finally determined to be held invalid or unenforceable.

Parties making claims against us may seek and obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize our product candidates. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would involve a substantial diversion of employee resources from our business. We may not have sufficient resources to bring these actions to a successful conclusion, which may result in significant cost and may impede our inability to pursue any affected products or product candidates. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of shares of our common stock.

In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, obtain one or more licenses from third parties, pay royalties or redesign our infringing products, which may be impossible or require substantial time and monetary expenditure.

Obtaining and maintaining our 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 fees on any issued patent are due to be paid to the USPTO and foreign patent agencies in several stages over the lifetime of the patent. 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. 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. Noncompliance events that could result in abandonment or lapse of a patent or patent

application include, but are not limited to, 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, our competitors might be able to enter the market earlier than would otherwise have been the case, which would have a material adverse effect on our business.

Some intellectual property that we have in-licensed may have been discovered through government funded programs and thus may be subject to federal regulations such as "march-in" rights, certain reporting requirements and a preference for U.S.-based companies. Compliance with such regulations may limit our exclusive rights and limit our ability to contract with non-U.S. manufacturers.

Any of the intellectual property rights that we have licensed or we may license in the future and that have been generated through the use of U.S. government funding are subject to certain federal regulations. As a result, the U.S. government may have certain rights to intellectual property embodied in our current or future product candidates pursuant to the Bayh-Dole Act of 1980 (the "Bayh-Dole Act"). These U.S. government rights in certain inventions developed under a government-funded program include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose. In addition, the U.S. government has the right to require us to grant exclusive, partially exclusive, or non-exclusive licenses to any such intellectual property rights to a third party if it determines that: (i) adequate steps have not been taken to commercialize the invention; (ii) government action is necessary to meet public health or safety needs; or (iii) government action is necessary to meet requirements for public use under federal regulations (also referred to as "march-in rights"). The U.S. government also has the right to take title to such intellectual property rights if we, or the applicable licensor, fail to disclose the invention to the government and fail to file an application to register the intellectual property within specified time limits. Intellectual property generated under a government funded program is also subject to certain reporting requirements, compliance with which may require us or the applicable licensor to expend substantial resources. We cannot be certain that our current or future licensors will comply with the disclosure or reporting requirements of the Bayh-Dole Act at all times, or be able to rectify any lapse in compliance with these requirements.

In addition, the U.S. government requires that any products embodying the subject invention or produced through the use of the subject invention be manufactured substantially in the United States. The manufacturing preference requirement can be waived if the owner of the intellectual property can show that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible. This preference for U.S. manufacturers may limit our ability to contract with non-U.S. product manufacturers for products covered by such intellectual property. To the extent any of our current or future intellectual property is generated through the use of U.S. government funding, the provisions of the Bayh-Dole Act may similarly apply.

We may become involved in lawsuits to protect or enforce our patents or other intellectual property, which could be expensive, time-consuming and unsuccessful.

Competitors may infringe our patents, trademarks, copyrights or other intellectual property. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming and divert the time and attention of our management and scientific personnel. Any claims we assert against perceived infringers could provoke these parties to assert counterclaims against us alleging that we infringe their patents, in addition to counterclaims asserting that our patents are invalid or unenforceable, or both. In any patent infringement proceeding, there is a risk that a court will decide that a patent of ours is invalid or unenforceable, in whole or in part, and that we do not have the right to stop the other party from using the invention at issue. There is also a risk that, even if the validity of such patents is upheld, the court will construe the patent's claims narrowly or decide that we do not have the right to stop the other party from using the invention at issue on the grounds that our patent claims do not cover the invention. An adverse outcome in a litigation or proceeding involving our patents could limit our ability to assert our patents against those parties or other competitors, and may curtail or preclude our ability to exclude third parties from making and selling similar or competitive products. Any of these occurrences could adversely affect our competitive business position, business prospects and financial condition. Similarly, if we assert trademark infringement claims, a court may determine that the marks we have

asserted are invalid or unenforceable, or that the party against whom we have asserted trademark infringement has superior rights to the marks in question. In this case, we could ultimately be forced to cease use of such trademarks.

Even if we establish infringement, the court may decide not to grant an injunction against further infringing activity and instead award only monetary damages, which may or may not be an adequate remedy. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of shares of our common stock. Moreover, there can be no assurance that we will have sufficient financial or other resources to file and pursue such infringement claims, which typically last for years before they are concluded. Even if we ultimately prevail in such claims, the monetary cost of such litigation and the diversion of the attention of our management and scientific personnel could outweigh any benefit we receive as a result of the proceedings. Any of the foregoing may have a material adverse effect on our business, financial condition, results of operations and prospects.

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

As is the case with other biopharmaceutical companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biopharmaceutical industry involves both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain. In addition, the United States has recently enacted and is currently implementing wide-ranging patent reform legislation. 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. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. For example, in the case, *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, the Supreme Court held that certain claims to DNA molecules are not patentable. In addition, the case *Amgen Inc. v. Sanofi* affects the way antibody claims are examined and litigated. While we do not believe that any of the patents owned or licensed by us will be found invalid based on these decisions, we cannot predict how future decisions by the courts, the Congress or the USPTO may impact the value of our patents.

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

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

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of some countries do not favor the enforcement of patents and other intellectual property protection, which could make it difficult for us to stop the infringement of our patents generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing and could provoke third parties to assert

claims against us. We may not prevail in any lawsuits that we initiate, and the damages or other remedies awarded, if any, may not be commercially meaningful.

Many countries have compulsory licensing laws under which a patent owner may be compelled under specified circumstances to grant licenses to third parties. In addition, many countries limit the enforceability of patents against government agencies or government contractors. In those countries, we may have limited remedies if patents are infringed or if we are compelled to grant a license to a third party, which could materially diminish the value of those patents. This could limit our potential revenue opportunities. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license, which could adversely affect 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. In the United States, if all maintenance fees are timely paid, the natural expiration of a patent is generally 20 years from its earliest filing date of a non-provisional application to which the patent claims priority. 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 for a product candidate, we may be open to competition from competitive medications, including generic medications. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such product candidates might expire before or shortly after such product candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing product candidates similar or identical to ours.

If we do not obtain patent term extension ("PTE") and data exclusivity for VOR33 or any other product candidates we may develop, our business may be materially harmed.

Depending upon the timing, duration and conditions of any FDA marketing approval of our product candidates, one or more of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, referred to as the Hatch-Waxman Amendments, and similar legislation in the European Union. The Hatch-Waxman Amendments permit a patent term extension of up to five years for a patent covering an approved product as compensation for effective patent term lost during product development and the FDA regulatory review process. However, we may not receive an extension if we fail to exercise due diligence during the testing phase or regulatory review process, fail to apply within applicable deadlines, fail to apply prior to expiration of relevant patents or otherwise fail to satisfy applicable requirements. Moreover, the length of the extension could be less than we request. Only one patent per approved product can be extended, the extension cannot extend the total patent term beyond 14 years from approval and only those claims covering the approved drug, a method for using it or a method for manufacturing it may be extended. If we are unable to obtain patent term extension or the term of any such extension is less than we request, the period during which we can enforce our patent rights for the applicable product candidate will be shortened and our competitors may obtain approval to market competing products sooner. As a result, our revenue from applicable products could be reduced. Further, if this occurs, our competitors may take advantage of our investment in development and trials by referencing our clinical and preclinical data and launch their product earlier than might otherwise be the case, and our competitive position, business, financial condition, results of operations, and prospects could be materially harmed.

Third parties may assert that our employees or consultants have wrongfully used or disclosed confidential information or misappropriated trade secrets.

We employ individuals who were previously employed at universities or other biopharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees and consultants do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or

disclosed intellectual property, including trade secrets or other proprietary information, of a former employer or other third parties. We may also be subject to claims that patents and applications that we may file to protect inventions of our employees or consultants are rightfully owned by their former employers or other third parties. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees. Any of the foregoing would harm our business, financial condition, results of operations, and prospects.

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.

Our registered or unregistered trademarks or trade names may be challenged, infringed, circumvented or declared generic or determined to be infringing on other marks. We may not be able to protect our rights to these trademarks and trade names, which we need to build name recognition among potential partners or customers in our markets of interest. At times, competitors or other third parties 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 affect our business, financial condition, results of operations and growth prospects.

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:

- VOR33, VCAR33 and any other product candidates we may develop may eventually become available in generic or biosimilar product forms;
- others may be able to make products that are similar to any product candidates we may develop or utilize similar technology but that are not covered by the claims of the patents that we license or own;
- we, or our current or future licensors might not have been the first to make the inventions covered by the issued patent or pending patent application that we license or own;
- we, or our current or future licensors might not have been the first to file patent applications covering certain of our or their inventions;
- we, or our license partners or current or future collaborators, may fail to meet our obligations to the U.S. government regarding any in-licensed patents and patent applications funded by U.S. government grants, leading to the loss or unenforceability of patent rights;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our owned or licensed intellectual property rights;
- it is possible that our pending, owned or licensed patent applications or those that we may own 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;
- it is possible that our pending owned or licensed patent applications or those that we may own or license in the future will not lead to issued patents;
- issued patents that we hold rights to may be held invalid or unenforceable, including as a result of legal challenges by our competitors;
- the claims of our owned or in-licensed issued patents or patent applications, if and when issued, may not cover our product candidates;
- 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 patents;
- we may not develop additional proprietary technologies that are patentable;
- any product candidates we develop may be covered by third parties' patents or other exclusive rights;
- 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 harm our business, financial condition, results of operations, and prospects.

Risks Related to Regulatory and Other Legal Compliance Matters

Failure to obtain marketing approval in foreign jurisdictions would prevent product candidates from being marketed in such jurisdictions, which, in turn, would materially impair our ability to generate revenue.

In order to market and sell product candidates in the European Union and other foreign jurisdictions, we or our third-party collaborators must obtain separate marketing approvals (a single one for the European Union) 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 candidate be approved for reimbursement before the product candidate 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 products in any jurisdiction, which would materially impair our ability to generate revenue.

The withdrawal of the United Kingdom from the European Union, commonly referred to as "Brexit," may adversely impact our ability to obtain regulatory approvals of our product candidates in the European Union, result in restrictions or imposition of taxes and duties for importing our product candidates into the European Union, and may require us to incur additional expenses in order to develop, manufacture and commercialize our product candidates in the European Union.

Following the result of a referendum in 2016, the United Kingdom left the European Union on January 31, 2020, commonly referred to as Brexit. 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 (the "Transition Period") during which European Union rules continued to apply. A trade and cooperation agreement (the "Trade and Cooperation Agreement") that outlines the future trading relationship between the United Kingdom and the European Union was agreed in December 2020.

Since a significant proportion of the regulatory framework in the United Kingdom applicable to our business and our product candidates is derived from European Union directives and regulations, Brexit has had, and will continue to have, a material impact upon the regulatory regime with respect to the development, manufacture, importation, approval and commercialization of our product candidates in the United Kingdom or the European Union. For example, Great Britain is no longer covered by the centralized procedures for obtaining European Union-wide marketing authorization from the EMA and a separate marketing authorization will be required to market our product candidates in Great Britain. It is currently unclear whether the Medicines & Healthcare products Regulatory Agency in the United Kingdom is sufficiently prepared to handle the increased volume of marketing authorization applications that it is likely to receive. Any delay in obtaining, or an inability to obtain, any marketing approvals, would delay or prevent us from commercializing our product candidates in the United Kingdom or the European Union and restrict our ability to generate revenue and achieve and sustain profitability.

While the Trade and Cooperation Agreement provides for the tariff-free trade of medicinal products between the United Kingdom and the European Union there may be additional non-tariff costs to such trade which did not exist prior to the end of the Transition Period. Further, should the United Kingdom diverge from the European Union from a regulatory perspective in relation to medicinal products, tariffs could be put into place in the future. We could therefore, both now and in the future, face significant additional expenses (when compared to the position prior to the end of the Transition Period) to operate our business, which could significantly and materially harm or delay our ability to generate revenues or achieve profitability of our business. Any further changes in international trade, tariff and import/export regulations as a result of Brexit or otherwise may impose unexpected duty costs or other non-tariff barriers on us. These developments, or the perception that any of them could occur, may significantly reduce global trade and, in particular, trade between the impacted nations and the United Kingdom. It is also possible that Brexit may negatively affect our ability to attract and retain employees, particularly those from the European Union.

In the short term there is a risk of disrupted import and export processes due to a lack of administrative processing capacity by the respective United Kingdom and European Union customs agencies that may delay time-sensitive shipments and may negatively impact our product supply chain.

Even if we, or any collaborators we may have, obtain marketing approvals for VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates we may develop, the terms of approvals and ongoing regulation of our product candidates could require the substantial expenditure of resources and may limit how we, or they, manufacture and market our product candidates, 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, EMA, the Competent Authorities of the Member States of the European Union and other regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, facility registration and drug 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. The FDA and other regulatory authorities may restrict the use of our products to certain specialists and/or institutions and require formal reporting and approval of a REMS program. Such restrictions or requirements could deter use of our products by certain individuals or institutions.

Accordingly, assuming we, or any collaborators we may have, receive marketing approval for one or more product candidates, we, 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, the EMA, the Competent Authorities of the Member States of the European Union and other regulatory agencies closely regulate the post-approval marketing and promotion of products to ensure that they are marketed only for the approved indications and in accordance with the provisions of the approved labeling. The FDA, the Competent Authorities of the Member States of the European Union and other regulatory agencies impose stringent restrictions on manufacturers' communications regarding off-label use, and if we market our products for off-label use, 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. While physicians may prescribe products for off-label uses as the FDA and other U.S. regulatory agencies do not regulate a physician's choice of drug treatment made in the physician's independent medical judgment, they do restrict promotional communications from companies or their sales force with respect to off-label uses of products for which marketing clearance has not been issued. Companies may only share truthful and not misleading information that is otherwise consistent with a product's FDA approved labeling. Violation of the Federal Food, Product, and Cosmetic Act and other statutes, including the False Claims Act and equivalent legislation in other countries relating to the promotion and advertising of prescription products may also lead to investigations or allegations of violations of federal and state and other countries' health care fraud and abuse laws and state consumer protection laws. Even if it is later determined we were not in violation of these laws, we may be faced with negative publicity, incur significant expenses defending our actions and have to divert significant management resources from other matters.

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

- restrictions on such products, manufacturers or manufacturing processes;
- restrictions on the labeling or marketing of a product;
- restrictions on the distribution or use of a product;
- requirements to conduct post-marketing clinical trials;
- receipt of warning or untitled letters;
- withdrawal of the products from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;
- recall of products;

- fines, restitution or disgorgement of profits or revenue;
- restrictions on future procurements with governmental authorities;
- suspension or withdrawal of marketing approvals;
- suspension of any ongoing clinical trials;
- refusal to permit the import or export of our products;
- 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 may develop and adversely affect our business, financial condition, results of operations and prospects.

We expect the product candidates we develop will be regulated as biologics, and therefore they may be subject to competition sooner than anticipated.

The Biologics Price Competition and Innovation Act of 2009 (the "BPCIA"), was enacted as part of the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act (collectively, the "ACA") to establish an abbreviated pathway for the approval of biosimilar and interchangeable biological products. The regulatory pathway establishes legal authority for the FDA to review and approve biosimilar biologics, including the possible designation of a biosimilar as "interchangeable" based on its similarity to an approved biologic. Under the BPCIA, an application for a biosimilar product cannot be approved by the FDA until 12 years after the reference product was approved under a BLA. 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. While it is uncertain when processes intended to implement the BPCIA may be fully adopted by the FDA, any of these processes could have a material adverse effect on the future commercial prospects for our biological products.

We believe that any of the product candidates we develop that is approved in the United States 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 the subject product candidates to be reference products for competing products, potentially creating the opportunity for generic competition sooner than anticipated. Moreover, the extent to which a biosimilar, once approved, will be substituted for any one of the 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.

In addition, the approval of a biologic product biosimilar to one of our products could have a material adverse impact on our business as it may be significantly less costly to bring to market and may be priced significantly lower than our products.

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

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, statutory, regulatory, and policy changes, the FDA's ability to hire and retain key personnel and accept the payment of user fees, and other events that may otherwise affect the FDA's ability to perform routine functions. Average review times at the agency have fluctuated in recent years as a result. In addition, government funding of other government agencies that fund research and development activities is subject

to the political process, which is inherently fluid and unpredictable. Disruptions at the FDA and other agencies may also slow the time necessary for new biologics or modifications to cleared or approved biologics to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, including for 35 days beginning on December 22, 2018, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA, have had to furlough critical FDA employees and stop critical activities.

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

Our relationships with healthcare providers, including physicians, and third-party payors will be subject to applicable anti-kickback, fraud and abuse, anti-bribery and other healthcare laws and regulations, which could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers and third-party payors play a primary role in the recommendation and prescription of any product candidates for which we obtain marketing approval. Our current and future arrangements with healthcare providers, third-party payors and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we research as well as market, sell and distribute our products for which we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations, including certain laws and regulations applicable only if we have marketed products, include, but are not limited to, the following:

- the federal healthcare program Anti-Kickback Statute, which prohibits, among other things, persons or entities from knowingly and willfully soliciting, receiving, offering, or providing any remuneration (including any kickback, bribe or certain rebates), directly or indirectly, in cash or in kind, to induce, or in return for, either the referral of an individual, for the purchase, lease, order or recommendation of any item, good, facility, or service for which payment may be made, in whole or in part, under federal healthcare programs such as Medicare and Medicaid. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;
- federal false claims, including the False Claims Act that can be enforced through whistleblower actions, false statements and civil monetary penalties laws, which prohibit, among other things, any person or entity from knowingly presenting, or causing to be presented, a false or fraudulent claim for payment of government funds or knowingly making, or causing to be made, a false record or statement material to a false or fraudulent claim to get a false claim paid or to avoid, decrease, or conceal an obligation to pay money to the federal government. In addition, the government may assert that a claim including items and services resulting from a violation of the U.S. federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act;
- the federal Health Insurance Portability and Accountability Act of 1996 (“HIPAA”), which, prohibits, among other things, executing, or attempting to execute, a scheme to defraud any healthcare benefit program or making false, fictitious, or fraudulent statements in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;

- the federal Food, Drug, and Cosmetic Act, which among other things, strictly regulates drug marketing, prohibits manufacturers from marketing such products for off-label use and regulates the distribution of samples;
- federal laws that require pharmaceutical manufacturers to report certain calculated product prices to the government or provide certain discounts or rebates to government authorities or private entities, often as a condition of reimbursement under government healthcare programs;
- the federal Physician Payments Sunshine Act, which requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid, or the Children's Health Insurance Program (with certain exceptions) to report annually to the CMS within the U.S. Department of Health and Human Services, information related to payments or other transfers of value made during the previous year 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. Beginning in 2022, such obligations will include reporting payments and other transfers of value provided in the previous year to certain other healthcare professionals, including physician assistants, nurse practitioners, clinical nurse specialists, certified nurse anesthetists, anesthesiologist assistants, and certified nurse midwives; and
- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws, which may be broader in scope and apply to healthcare items or services that are reimbursed by non-governmental third-party payors, including private insurers.

Some state laws also require pharmaceutical companies to comply with specific compliance standards, restrict financial interactions between pharmaceutical companies and healthcare providers or require pharmaceutical companies to report information related to payments to health care providers or marketing expenditures. Certain state laws also require the reporting of information related to drug pricing. Further, certain state and local laws require the registration of pharmaceutical sales representatives.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. Given the breadth of the laws and regulations and evolving government interpretations of the laws and regulations, governmental authorities may possibly conclude that our business practices, including certain of our advisory board arrangements with physicians, some of whom are compensated in the form of stock or stock options, may not comply with healthcare laws and regulations. If our operations are found to be in violation of any of the laws described above or any other government regulations that apply to us, we may be subject to significant penalties, including administrative, civil and criminal penalties, damages, fines, disgorgement, exclusion from participation in government health care programs, such as Medicare and Medicaid, imprisonment, integrity oversight and reporting obligations, contractual damages, reputational harm, diminished profits and future earnings, and the curtailment or restructuring of our operations, any of which could adversely affect our business, financial condition, results of operations, and prospects.

The European Union has strict laws governing the provision of benefits or advantages to healthcare professionals in order to induce or encourage the prescription, recommendation, endorsement, purchase, supply, order, or use of medicinal products. Such laws and associated codes of practice set out the rules and requirements that the provision of hospitality, sponsorship, gifts and promotional items must meet before they can be accepted by healthcare professionals. The provision of benefits or advantages to healthcare professionals is also governed by the national anti-bribery laws of European Union Member States. Infringement of these laws could result in substantial fines and imprisonment.

Payments made to healthcare professionals in certain European Union Member States may be publicly disclosed. Moreover, agreements with healthcare professionals often must be the subject of prior notification and approval by the healthcare professionals' employer, his or her competent professional organization, and/or the regulatory authorities of the individual European Union Member States. These requirements are provided in the national laws, industry codes, or professional codes of conduct applicable in the European Union Member States. Failure to comply with these requirements could result in reputational risk, public reprimands, administrative penalties, fines or imprisonment.

Healthcare and other reform legislation, may increase the difficulty and cost for us and any collaborators we may have to obtain marketing approval of and commercialize VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates we may develop and affect the prices we, or they, may obtain.

In the United States and some foreign jurisdictions, there have been and continue to be ongoing efforts to implement legislative and regulatory changes regarding the healthcare system. Such changes could prevent or delay marketing approval of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates that we may develop, restrict or regulate post-approval activities and affect our ability to profitably sell any product candidates for which we obtain marketing approval. Although we cannot predict what healthcare or other reform efforts will be successful, such efforts may result in more rigorous coverage criteria, in additional downward pressure on the price that we, or our future collaborators, may receive for any approved products or in other consequences that may adversely affect our ability to achieve or maintain profitability.

Within the United States, the federal government and individual states have aggressively pursued healthcare reform, as evidenced by the passing of the ACA. The ACA substantially changed the way healthcare is financed by both governmental and private insurers and contains a number of provisions that affect coverage and reimbursement of drug products and/or that could potentially reduce the demand for pharmaceutical products such as increasing drug rebates under state Medicaid programs for brand name prescription drugs and extending those rebates to Medicaid managed care and assessing a fee on manufacturers and importers of brand name prescription drugs reimbursed under certain government programs, including Medicare and Medicaid. Other aspects of healthcare reform, such as expanded government enforcement authority and heightened standards that could increase compliance-related costs, could also affect our business. There are, and may continue to be, judicial challenges, including review by the United States Supreme Court. See “Business—Healthcare Reform” in Part I, Item 1 of this Annual Report. We cannot predict the ultimate content, timing or effect of any changes to the ACA or other federal and state reform efforts. There is no assurance that federal or state health care reform will not adversely affect our future business and financial results, and we cannot predict how future federal or state legislative, judicial or administrative changes relating to healthcare reform will affect our business.

Federal and state governments have shown significant interest in implementing cost-containment programs to limit the growth of government-paid healthcare costs, including price controls, waivers from Medicaid drug rebate law requirements, restrictions on reimbursement and requirements for substitution of generic products for branded prescription drugs. The private sector has also sought to control healthcare costs by limiting coverage or reimbursement or requiring discounts and rebates on products. We are unable to predict what additional legislation, regulations or policies, if any, relating to the healthcare industry or third party coverage and reimbursement may be enacted in the future or what effect such legislation, regulations or policies would have on our business. Any cost containment measures could significantly decrease the available coverage and the price we might establish for our potential products, which would have an adverse effect on our net revenues and operating results.

Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for biotechnology products. We cannot be sure whether additional legislative changes will be enacted, or whether FDA regulations, guidance or interpretations for biological products will be changed, or what the impact of such changes on the marketing approvals of our product candidates, if any, may be. In addition, increased scrutiny by the U.S. Congress of the FDA’s approval and decision-making processes may significantly delay or prevent marketing approval, as well as subject us to more stringent product labeling and post-marketing testing and other requirements.

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, consultants and commercial partners, and, if we commence clinical trials, our principal investigators. 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 EMA 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, the EMA 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 may be subject to numerous laws and regulations in each jurisdiction outside the United States in which we may 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 (the "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 Department of Justice. The SEC is involved with enforcement of the books and records provisions of the FCPA.

Similarly, the U.K. Bribery Act 2010 has extra-territorial effect for companies and individuals having a connection with the United Kingdom. The U.K. Bribery Act prohibits inducements both to public officials and private individuals and organizations. Compliance with the FCPA and the U.K. Bribery Act is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the FCPA 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.

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 product candidates outside of the United States, which could limit our growth potential and increase our development costs. The failure to comply with laws governing international business practices may result in substantial penalties, including suspension or debarment from government contracting. Violation of 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.

We or our partners may be subject to stringent privacy laws, information security laws, regulations, policies and contractual obligations related to data privacy and security and changes in such laws, regulations, policies or how they are interpreted or changes in contractual obligations could adversely affect our business.

There are numerous U.S. federal and state data privacy and protection laws and regulations that apply to the collection, transmission, processing, storage and use of personally-identifying information, which among other things, impose certain requirements relating to the privacy, security and transmission of personal information. The legislative and regulatory landscape for privacy and data protection continues to evolve in jurisdictions worldwide, and there has been an increasing focus on privacy and data protection issues with the potential to affect our business. Failure to comply with any of these laws and regulations could result in enforcement action against us, including fines, imprisonment of company officials and public censure, claims for damages by affected individuals, damage to our reputation and loss of goodwill, any of which could have a material adverse effect on our business, financial condition, results of operations or prospects.

If we are unable to properly protect the privacy and security of health-related information or other sensitive or confidential information in our possession, we could be found to have breached our contracts. Further, if we fail to comply with applicable privacy laws, including applicable HIPAA privacy and security standards, we could face significant administrative, civil and criminal penalties. Enforcement activity can also result in financial liability and reputational harm, and responses to such enforcement activity can consume significant internal resources. In addition, state attorneys general are authorized to bring civil actions seeking either injunctions or damages in response to violations that threaten the privacy of state residents. In addition to the risks associated with enforcement activities and potential contractual liabilities, our ongoing efforts to comply with evolving laws and regulations at the federal and state level may be costly and require ongoing modifications to our policies, procedures and systems.

Risks Related to COVID-19, Employee Matters, Managing Growth and Information Technology

The COVID-19 pandemic has caused, and could continue to cause, severe disruptions in the U.S., regional and global economies and could seriously harm our development efforts, increase our costs and expenses and have a material adverse effect on our business, financial condition and results of operations.

The COVID-19 pandemic has caused widespread disruptions to the U.S. and global economy and has contributed to significant volatility and negative pressure in financial markets. The global impact of the pandemic is continually evolving and, as additional cases of the virus are identified, many countries, including the United States, have reacted by instituting quarantines, restrictions on travel and mandatory closures of businesses. Certain states and cities, including where we or the third parties with whom we engage operate, have also reacted by instituting quarantines, restrictions on travel, "stay at home" rules, restrictions on types of business that may continue to operate and restrictions on the types of construction projects that may continue.

The extent to which the COVID-19 pandemic impacts our business, financial condition and results of operations will depend on future developments, which are highly uncertain and cannot be predicted with confidence, including the scope, severity and duration of such pandemic, the actions taken to contain the pandemic or mitigate its impact, as well as the effect of any relaxation of current restrictions within the communities or regions in which we, our partners and proposed clinical sites are located, and the direct and indirect economic effects of the pandemic and containment measures, among others. The rapid development and fluidity of this situation precludes any prediction as to the full adverse impact of the COVID-19 pandemic. Nevertheless, the COVID-19 pandemic has adversely affected, and may continue to adversely affect, our business, financial condition and results of operations, and it has had, and may continue to have, the effect of heightening many of the risks described in these Risk Factors, including but not limited to, the following:

- The COVID-19 pandemic has had, and will likely continue to have, an adverse impact on various aspects of our on preclinical studies and clinical trials that we expected to initiate in 2021. For example, we may experience delays in the initiation of our planned clinical trials, investigators may be deployed to care for

COVID-19 patients, IRBs may be backlogged with clinical trials related to the pandemic, patients may defer receiving HSCT, HSCT-donors may be less available to travel for stem cell mobilizations, hospital beds and resources normally dedicated to cancer patients may be redeployed to treat COVID-19 patients and there may be disruption in the supply of critical agents (such as Mylotarg) or other supportive care agents needed for our clinical trials or for HSCT.

- Other potential impacts of the COVID-19 pandemic on our clinical trials include impacts on patient dosing and study monitoring, which may be paused or delayed due to changes in policies at various clinical sites; federal, state, local or foreign laws, rules and regulations, including quarantines or other travel restrictions; the prioritization of healthcare resources toward pandemic efforts, including diminished attention from physicians serving as our clinical trial investigators and reduced availability of site staff supporting the conduct of our clinical trials; and interruption or delays in the operations of the FDA, among other reasons related to the COVID-19 pandemic. If the COVID-19 pandemic continues, other aspects of our planned clinical trial will likely be adversely affected, delayed or interrupted, including, for example, site initiation, patient recruitment and enrollment, availability of clinical trial materials and data analysis. Some patients and clinical investigators may not be able to comply with clinical trial protocols and patients may choose to withdraw from our planned trials once initiated or we may choose to, or be required to, pause enrollment and or patient dosing in our planned clinical trials in order to preserve health resources and protect trial participants. It is unknown how long these pauses or disruptions would continue if they occur.
- We currently rely on or expect to rely on third parties, including CROs, contract manufacturing organizations and other contractors and consultants to, among other things, conduct our preclinical studies and clinical trials, manufacture raw materials, manufacture and supply our product candidates, perform quality testing and supply other goods and services to run our business. If any such third party is adversely impacted by restrictions resulting from the COVID-19 pandemic, including staffing shortages, production slowdowns and disruptions in delivery systems, our supply chain may be disrupted, which could limit our ability to manufacture our product candidates for our planned clinical trials and conduct our research and development operations.
- We have in the past, and may again in the future, be required to establish a work-from-home policy for employees. Any increased reliance on personnel working from home may negatively impact productivity, or disrupt, delay or otherwise adversely impact our business, which includes research and development work that is dependent on a laboratory. In addition, this could increase our cyber security risk, create data accessibility concerns and make us more susceptible to communication disruptions, any of which could adversely impact our business operations or delay necessary interactions with local and federal regulators, ethics committees, manufacturing sites, research or clinical trial sites and other important agencies and contractors.
- Our employees and contractors conducting non-business critical research and development activities have recently not been, and may not in the future be able to, access our laboratory for an extended period of time as a result of work-from-home policies and the possibility that governmental authorities further modify current restrictions. This could delay timely completion of preclinical activities, including completing IND enabling studies or our ability to select future development candidates, and initiation of planned clinical trials for our other product candidates.
- Certain government agencies, such as health regulatory agencies and patent offices, within the United States or internationally have experienced, and may continue to experience, disruptions in their operations as a result of the COVID-19 pandemic. The FDA and comparable foreign regulatory agencies may have slower response times or be under-resourced to continue to monitor our clinical trials and, as a result, review, inspection and other timelines may be materially delayed. FDA has experienced delays in on-site inspections and this could have an impact on the timing for clearance and approvals of BLAs. Health Canada has extended their reviews of Clinical Trial Applications due to resource issues during the pandemic and similar increases in review times of INDs by FDA could occur. Also, the ability of health authorities to meet with us and other companies involved in our research and clinical development activities may be delayed or otherwise adversely affected. It is unknown how long these disruptions could continue. Any elongation or de-prioritization of our clinical trials or delay in regulatory review resulting from such disruptions could materially adversely affect the development and study of our product

candidates. For example, regulatory authorities may require that we not distribute a product candidate lot until the relevant agency authorizes its release. Such release authorization may be delayed as a result of the COVID-19 pandemic, which would likely result in delays to our ongoing clinical trials.

Our future success depends on our ability to retain our Chief Executive Officer, Chief Technology Officer and other key executives and to attract, retain and motivate qualified personnel.

We are highly dependent on Robert Ang, MBBS, MBA, our Chief Executive Officer, and Sadik Kassim, Ph.D., our Chief Technology Officer, as well as the other principal members of our management and scientific teams. Drs. Ang and Kassim and such other principal members are employed "at will," meaning we or they may terminate the employment at any time. We do not maintain "key person" insurance for any of our executives or other employees. The loss of the services of any of these persons could impede the achievement of our research, development and commercialization objectives.

Recruiting and retaining qualified scientific and clinical personnel and, if we progress the development of our product candidates toward scaling up for commercialization, manufacturing and sales and marketing personnel will also be critical to our success. We may not be able to attract and retain these 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, including our scientific founder, 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. The inability to recruit, or loss of services of certain executives, key employees, consultants or advisors, may impede the progress of our research, development and commercialization objectives and have a material adverse effect on our business, financial condition, results of operations and prospects.

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

As of March 1, 2021, we had 88 full-time employees and, in connection with the growth and advancement of our pipeline and having become a public company, we expect to increase the number of our employees and the scope of our operations, particularly in the areas of drug development, regulatory affairs, manufacturing and, as our product candidates advance through later stages of clinical development, sales and marketing. 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 expected expansion of our operations or recruit and train additional qualified personnel. Moreover, the expected physical 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.

As a growing biotechnology company, we are actively pursuing new platforms and product candidates in many therapeutic areas and across a wide range of diseases. Successfully developing product candidates for and fully understanding the regulatory and manufacturing pathways to all of these therapeutic areas and disease states requires a significant depth of talent, resources and corporate processes in order to allow simultaneous execution across multiple areas. Due to our limited resources, we may not be able to effectively manage this simultaneous execution and the expansion of our operations or recruit and train additional qualified personnel. This may result in weaknesses in our infrastructure, give rise to operational mistakes, legal or regulatory compliance failures, loss of business opportunities, loss of employees and reduced productivity among remaining employees. The physical expansion of our operations may lead to significant costs and may divert financial resources from other projects, such as the development of our product candidates. If our management is unable to effectively manage our expected development and expansion, our expenses may increase more than expected, our ability to generate or increase our revenue could be reduced and we may not be able to implement our business strategy. Our future financial

performance and our ability to compete effectively and commercialize our product candidates, if approved, will depend in part on our ability to effectively manage the future development and expansion of our company.

Our insurance policies may be inadequate and potentially expose us to unrecoverable risks.

We have limited director and officer insurance and commercial insurance policies. Any significant insurance claims would have a material adverse effect on our business, financial condition and results of operations. Insurance availability, coverage terms and pricing continue to vary with market conditions. We endeavor to obtain appropriate insurance coverage for insurable risks that we identify; however, we may fail to correctly anticipate or quantify insurable risks, we may not be able to obtain appropriate insurance coverage, and insurers may not respond as we intend to cover insurable events that may occur. We have observed rapidly changing conditions in the insurance markets relating to nearly all areas of traditional corporate insurance. Such conditions have resulted in higher premium costs, higher policy deductibles and lower coverage limits. For some risks, we may not have or maintain insurance coverage because of cost or availability.

Our internal computer systems, or those of our third-party vendors, collaborators or other contractors or consultants, may fail or suffer security breaches, which could result in a material disruption of our product development programs, compromise sensitive information related to our business or prevent us from accessing critical information, potentially exposing us to liability or otherwise adversely affecting our business.

Our internal computer systems and those of our current and any future third-party vendors, collaborators and other contractors or consultants are vulnerable to damage or interruption from computer viruses, computer hackers, malicious code, employee theft or misuse, denial-of-service attacks, sophisticated nation-state and nation-state-supported actors, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. While we seek to protect our information technology systems from system failure, accident and security breach, if such an event were to occur and cause interruptions in our operations, it could result in a disruption of our development programs and our business operations, whether due to a loss of our trade secrets or other proprietary information or other disruptions. For example, the loss of clinical trial data from future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. If we were to experience a significant cybersecurity breach of our information systems or data, the costs associated with the investigation, remediation and potential notification of the breach to counter-parties and data subjects could be material. In addition, our remediation efforts may not be successful. If we do not allocate and effectively manage the resources necessary to build and sustain the proper technology and cybersecurity infrastructure, we could suffer significant business disruption, including transaction errors, supply chain or manufacturing interruptions, processing inefficiencies, data loss or the loss of or damage to intellectual property or other proprietary information.

Although we take such steps to help protect confidential and other sensitive information from unauthorized access or disclosure, our information technology and infrastructure has been in the past and may be vulnerable in the future to attacks by hackers or viruses, failures, or breaches due to third-party action, employee negligence or error, malfeasance, or other incidents or disruptions. For example, we could be the target of phishing attacks seeking confidential information regarding our employees. Furthermore, while we have implemented data privacy and security measures in an effort to comply with applicable laws and regulations relating to privacy and data protection, some health-related and other personal information or confidential information may be transmitted to us by third parties, who may not implement adequate security and privacy measures, and it is possible that laws, rules and regulations relating to privacy, data protection, or information security may be interpreted and applied in a manner that is inconsistent with our practices or those of third parties who transmit health-related and other personal information or confidential information to us.

To the extent that we or these third parties are found to have violated such laws, rules or regulations or that any disruption or security breach were to result in a loss of, or damage to, our or our third-party vendors', collaborators' or other contractors' or consultants' data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability including litigation exposure, penalties and fines, we could become the subject of regulatory action or investigation, our competitive position could be harmed and the further development and commercialization of our product candidates could be delayed. Any of the above could have a material adverse effect on our business, financial condition, results of operations or prospects.

Risks Related to the Ownership of Our Common Stock

An active trading market for our common stock may not be sustained.

Our shares of common stock began trading on the Nasdaq Global Select Market on February 5, 2021. Given the limited trading history of our common stock, there is a risk that an active trading market for our shares will not be sustained, which could put downward pressure on the market price of our common stock and thereby affect the ability of our stockholders to sell their shares.

The market price of our common stock may be volatile.

Our stock price is, and is likely to continue to be, volatile. For example, our stock traded within a range of a high price of $63.62 and a low price of $25.32 per share for the period of February 5, 2021, our first day of trading on the Nasdaq Global Select Market, through March 5, 2021. As a result of volatility, our stockholders may not be able to sell their common stock at or above the prices at which they purchased their shares. Some of the factors that may cause the market price of our common stock to fluctuate include:

- the success of existing or new competitive product candidates or technologies;
- the timing and results of preclinical studies and clinical trials for VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any other product candidates that we may develop;
- failure or discontinuation of any of our product development and research programs;
- results of preclinical studies, clinical trials or regulatory approvals of product candidates of our competitors, or announcements about new research programs or product candidates of our competitors;
- developments or changing views regarding the use of genetic medicines, including those that involve genome engineering;
- commencement or termination of collaborations for our product development and research programs;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- the level of expenses related to any of our research programs, product candidates or clinical development programs;
- the results of our efforts to develop additional product candidates or products;
- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us, our insiders or other stockholders;
- expiration of market stand-off or lock-up agreements;
- variations in our financial results or those of companies that are perceived to be similar to us;
- changes in estimates or recommendations by securities analysts, if any, that cover our stock;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors;
- global or regional public health emergencies, including the COVID-19 pandemic;
- general economic, industry and market conditions; and

- the other factors described in this “Risk Factors” section.

In recent years, the stock market in general, and the market for pharmaceutical and biotechnology companies in particular, has experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to changes in the operating performance of the companies whose stock is experiencing those price and volume fluctuations. Broad market and industry factors may seriously affect the market price of our common stock, regardless of our actual operating performance. Following periods of such volatility in the market price of a company’s securities, securities class action litigation has often been brought against that company. Because of the potential volatility of our stock price, we may become the target of securities litigation in the future, which could result in substantial costs and divert management’s attention and resources from our business.

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

The trading market for our common stock will be influenced by the research and reports that industry or financial analysts publish about us or our business. If one or more of the analysts covering our business downgrade their evaluations of our stock, the price of our stock could decline. If one or more of these analysts cease to cover our stock, we could lose visibility in the market for our stock, which in turn could cause our stock price to decline.

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

Sales of a substantial number of shares of our common stock in the public market could occur at any time. These sales, or the perception in the market that the holders of a large number of shares of common stock intend to sell shares, could reduce the market price of our common stock. Of the 37,127,865 shares of our common stock outstanding as of March 12, 2021, approximately 25,825,646 shares are currently subject to restrictions on transfer under 180-day lock-up arrangements with either the underwriters for our initial public offering or under agreements entered into between us and the holders of those shares. These restrictions are due to expire on August 4, 2021, resulting in these shares becoming eligible for public sale on August 5, 2021 if they are registered under the Securities Act of 1933, as amended (the “Securities Act”), or if they qualify for an exemption from registration under the Securities Act, including under Rules 144 or 701.

Moreover, holders of an aggregate of approximately 24,924,501 shares of our common stock will have rights, subject to conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders. We have also registered all shares of common stock that we may issue under our equity compensation plans or that are issuable upon exercise of outstanding options. These shares can be freely sold in the public market upon issuance and once vested, subject to volume limitations applicable to affiliates and the lock-up agreements described above. If any of these additional shares are sold, or if it is perceived that they will be sold, in the public market, the market price of our common stock could decline.

Insiders have substantial control over our company, which could limit the ability of our other stockholders to affect the outcome of key transactions, including a change of control.

As of March 12, 2021, our executive officers and directors, combined with our stockholders who owned more than 5% of our outstanding common stock, and their affiliates, in the aggregate, beneficially owned shares representing a majority of our outstanding common stock. As a result, these stockholders, if they act together, will be able to influence our management and affairs and all matters requiring stockholder approval, including the election of directors and approval of significant corporate transactions, such as a merger or other sale of our company or its assets. This concentration of ownership may have the effect of delaying or preventing a change in control of our company or discouraging a potential acquirer from making a tender offer or otherwise attempting to obtain control, even if that change in control would benefit our other stockholders. This significant concentration of ownership may also adversely affect the trading price for our common stock because investors often perceive

disadvantages in owning stock in companies with controlling stockholders. For information regarding the ownership of our outstanding stock by our executive officers, directors, and current beneficial owners of 5% or more of our voting securities and their respective affiliates, see the section titled "Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters."

If we fail to establish and maintain proper and effective internal control over financial reporting, our operating results and our ability to operate our business could be harmed.

Ensuring that we have adequate internal financial and accounting controls and procedures in place so that we can produce accurate financial statements on a timely basis is a costly and time-consuming effort that needs to be re-evaluated frequently. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements in accordance with generally accepted accounting principles.

Implementing any appropriate changes to our internal controls may distract our officers and employees, entail substantial costs to modify our existing processes and take significant time to complete. These changes may not, however, be effective in maintaining the adequacy of our internal controls, and any failure to maintain that adequacy, or consequent inability to produce accurate financial statements on a timely basis, could increase our operating costs and harm our business. In addition, investors' perceptions that our internal controls are inadequate or that we are unable to produce accurate financial statements on a timely basis may harm our common share price.

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," as defined in the Jumpstart Our Business Startups Act of 2012 (the "JOBS Act"), and may remain an emerging growth company for up to five years. For so long as we remain an emerging growth company, we are permitted and plan to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002 ("SOX"), 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, exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved, and being permitted to provide only two years of audited financial statements. As a result, the information we provide stockholders will be different than the information that is available with respect to other public companies. For example, we have not included all of the executive compensation related information in this Annual Report that would be required if we were not an emerging growth company. We cannot predict whether investors will find our common stock less attractive if we rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock, and our stock price may be more volatile.

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. This allows an emerging growth company to delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We have availed ourselves of this extended transition period and we can not predict whether investors will find our common stock less attractive due to this election.

We are also a "smaller reporting company" and we may continue to be a smaller reporting company if either (i) the market value of our stock held by non-affiliates is less than $250 million or (ii) our annual revenue is less than $100 million during the most recently completed fiscal year and the market value of our stock 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, similar to emerging growth companies, smaller reporting companies have reduced disclosure obligations regarding executive compensation.

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 "emerging growth 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. We expect that we will need to hire additional accounting, finance and other personnel in connection with our becoming, and our efforts to comply with the requirements of being, a public company, and our management and other personnel will need to devote a substantial amount of time towards maintaining compliance with these requirements. These requirements will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. 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 SOX Section 404, we will be required to furnish a report by our management on our internal control over financial reporting beginning with our next filing of an Annual Report on Form 10-K with the SEC. However, while we remain an emerging growth 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 SOX 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, potentially engage outside consultants, 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 SOX Section 404. If we identify one or more material weaknesses, it could result in an adverse reaction in the financial markets due to a loss of confidence in the reliability of our financial statements.

Our management team has broad discretion in the use of our cash reserves and may not use them effectively.

Our management has broad discretion to use our cash reserves and could use our cash reserves 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 harm our business, financial condition, results of operations and prospects. Pending their use, we may invest our cash reserves in a manner that does not produce income or that loses value.

We do not expect to pay any dividends for the foreseeable future. Accordingly our stockholders must rely on capital appreciation, if any, for any return on their investment.

We have never declared or paid any cash dividends on our equity securities. We do not anticipate that we will pay any dividends to holders of our common stock in the foreseeable future. Instead, we plan to retain any earnings to maintain and expand our existing operations. In addition, any future credit facility that we enter into may contain terms prohibiting or limiting the amount of dividends that may be declared or paid on our common stock. As a result, capital appreciation, if any, of our common stock will be stockholders' sole source of gain for the foreseeable future.

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

Our results of operations could be adversely affected by general conditions in the global economy and in the global financial markets. A severe or prolonged economic downturn, or additional global financial crises, whether related to the ongoing COVID-19 pandemic or not, could result in a variety of risks to our business, including weakened demand for our product candidates, if approved, or 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. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

Provisions in our certificate of incorporation and bylaws and under Delaware law could make a change in control of us, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our amended and restated certificate of incorporation and our amended and restated bylaws may discourage, delay or prevent a merger, acquisition or other change in control of us that stockholders may consider favorable, including transactions in which our stockholders might otherwise receive a premium for their shares. These provisions also could 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 not all members of the board are elected at one time;
- 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 the board;
- 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 stockholder rights plan, or so-called “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 66⅔% of the votes that all our stockholders would be entitled to cast to amend or repeal certain provisions of our charter or bylaws.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law (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. We have not elected to opt out of DGCL Section 203. These provisions could discourage potential acquisition proposals and could delay or prevent a change in control transaction. They could also have the effect of discouraging others from making tender offers for our common stock, including transactions that may be in our stockholders’ best interests. These provisions may also prevent changes in our management or limit the price that investors are willing to pay for our common stock.

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware and the federal district courts of the United States of America will be the exclusive forums for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware is the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law:

- any derivative action or proceeding brought on our behalf;
- any action asserting a breach of fiduciary duty;
- any action asserting a claim against us arising under the DGCL, our amended and restated certificate of incorporation or our amended and restated bylaws; and
- any action asserting a claim against us that is governed by the internal-affairs doctrine.

This provision would not apply to suits brought to enforce a duty or liability created by the Securities Exchange Act of 1934, as amended. 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 amended and restated certificate of incorporation further provides that the federal district courts of the United States will be the exclusive forum for resolving any complaint asserting a cause of action 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 amended and restated 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 a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage lawsuits against us and our directors, officers and other employees. If a court were to find either exclusive-forum provision in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving the dispute in other jurisdictions, which could seriously harm our business.

Item 1B. Unresolved Staff Comments.

Not applicable.

Item 2. Properties.

Our principal executive office is located at 100 Cambridgepark Drive, Suite 400, Cambridge, Massachusetts where we lease 32,798 square feet of office and laboratory space pursuant to a lease that terminates in June 2030. We believe that these facilities will be adequate for our near-term needs. If required, we believe that suitable additional or alternative space would be available in the future on commercially reasonable terms.

Item 3. Legal Proceedings.

From time to time, we may become involved in legal proceedings arising in the ordinary course of our business. We are not currently subject to any material legal proceedings. Regardless of outcome, such proceedings or claims can have an adverse impact on us because of defense and settlement costs, diversion of resources and other factors, and there can be no assurances that favorable outcomes will be obtained.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market Information

Our common stock trades on the Nasdaq Global Select Market under the symbol "VOR". Trading of our common stock commenced on February 5, 2021 in connection with our initial public offering ("IPO"). Prior to that time, there was no established public trading market for our common stock.

Holders

As of March 12, 2021, we had approximately 54 holders of record of our common stock. This number does not include beneficial owners whose shares were held in street name.

Dividend Policy

We have never declared or paid any cash dividends on our common stock. We currently intend to retain future earnings to fund the development and growth of our business. We do not expect to pay any cash dividends in the foreseeable future. In addition, the terms of any future debt agreements that we may enter into, may preclude us from paying dividends without the lenders' consent or at all.

Securities Authorized for Issuance Under Equity Compensation Plans

Information about our equity compensation plans in Item 12 of Part III of this Annual Report on Form 10-K ("Annual Report") is incorporated herein by reference.

Recent Sales of Unregistered Securities

Set forth below is information regarding shares of our common stock and preferred stock issued and stock options granted by us during the period covered by this Annual Report that were not registered under the Securities Act of 1933, as amended (the "Securities Act"). Also included is the consideration, if any, received by us for such shares, warrants and options and information relating to the section of the Securities Act, or rule of the Securities and Exchange Commission, under which exemption from registration was claimed.

(a) Issuance and sales of preferred stock

In February 2020, we issued an aggregate of 44,375,000 shares of our Series A-2 preferred stock to nine investors at a purchase price of $0.40 per share, for aggregate consideration of $17.8 million.

In June 2020, we issued an aggregate of 124,519,220 shares of our Series B preferred stock to 33 investors at a purchase price of $0.52 per share, for aggregate consideration of $64.7 million.

(b) Issuances Pursuant to Our Equity Plan

During the year ended December 31, 2020, we granted options under our 2015 Stock Incentive Plan, as amended, to purchase an aggregate of 3,961,989 shares of our common stock, at exercise prices ranging from $1.90 to $6.52 per share, to our employees, directors and consultants. Of these, 364,882 shares of common stock have been issued upon the exercise of options, and 23,256 options have been cancelled.

(c) Issuances Outside of Our Equity Plans

In October 2020, we granted an option to purchase 294,117 shares of our common stock outside of our equity incentive plan at an exercise price of $28.29 to an advisor.

None of the foregoing transactions involved any underwriters, underwriting discounts or commissions, or any public offering. We believe these transactions were exempt from registration under the Securities Act in reliance on Section 4(a)(2) of the Securities Act (and Regulation D promulgated thereunder) or Rule 701 promulgated under Section 3(b) of the Securities Act as transactions by an issuer not involving any public offering or under benefit plans and contracts relating to compensation as provided under Rule 701. The recipients of the securities in each of these transactions represented their intentions to acquire the securities for investment only and not with a view to or for sale in connection with any distribution thereof, and appropriate legends were placed on the share certificates issued in these transactions. All recipients had adequate access, through their relationships with us, to information about us. The sales of these securities were made without any general solicitation or advertising.

Purchase of Equity Securities

We did not purchase any of our equity securities registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act") during the period covered by this Annual Report on Form 10-K.

Use of Proceeds from Registered Securities

On February 9, 2021, we closed our initial public offering of 11,302,219 shares of our common stock, including 1,474,202 shares of our common stock pursuant to the full exercise by the underwriters of an option to purchase additional shares, at a public offering price of $18.00 per share for aggregate offering proceeds of approximately $203.4 million. The offer and sale of all of the shares in the offering were registered under the Securities Act pursuant to a registration statement on Form S-1 (File No. 333-252175), which was declared effective by the SEC on February 4, 2021, and a registration statement on Form S-1 (File No. 333-252766), which was deemed effective on February 5, 2021. Goldman Sachs & Co. LLC, Evercore Group L.L.C., Barclays Capital Inc. and Stifel, Nicolaus & Company, Incorporated acted as the lead book-running managers and representatives of the underwriters. The offering commenced on February 5, 2021 and did not terminate until the sale of all of the shares offered.

We received aggregate net proceeds from the offering of $186.3 million, after deducting underwriting discounts and commissions and other offering expenses payable by us. None of the underwriting discounts and commissions or other offering expenses were incurred or paid to directors or officers of ours or their associates or to persons owning 10% or more of our common stock or to any affiliates of ours.

Because the closing of our IPO occurred on February 9, 2021, as of December 31, 2020, we had not yet received the net proceeds from the sale of shares of common stock in our IPO and, therefore, had used none of the proceeds as of December 31, 2020. There has been no material change in our planned use of the net proceeds from the offering as described in our final prospectus filed with the SEC pursuant to Rule 424(b) under the Securities Act.

Item 6. Selected Consolidated Financial Data.

We are a smaller reporting company and emerging growth company, as defined by Rule 12b-2 of the Exchange Act, and are not required to provide this information.

Item 7. 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 consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K (the "Annual Report"). Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the section titled "Risk Factors," our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are a cell therapy company combining a novel patient engineering approach with targeted therapies to provide a single company solution for patients suffering from hematological malignancies. Leveraging our expertise in hematopoietic stem cell ("HSC") biology and genome engineering, we genetically modify HSCs to remove surface targets expressed by cancer cells and then provide these cells as stem cell transplants to patients. Once these cells engraft into bone marrow, we will have engineered the patient such that their HSCs and their blood cell progeny are designed to be treatment resistant to targeted therapies, which we believe will unlock the potential of these targeted therapies to selectively destroy cancerous cells while sparing healthy cells. As a result, our engineered HSCs ("eHSCs") are designed to limit the on-target toxicities associated with these targeted therapies, which we refer to as companion therapeutics, thereby enhancing their utility and broadening their applicability.

We are developing our lead eHSC product candidate, VOR33, and our companion therapeutic, VCAR33, which together, we believe, have the potential to transform the treatment paradigm for acute myeloid leukemia ("AML") and other hematological malignancies. We use genome engineering technology to remove CD33 surface targets from HSCs to create VOR33. Our Investigational New Drug ("IND") application for VOR33 in patients with AML was accepted by the U.S. Food and Drug Administration ("FDA") in January 2021, and we intend to initiate a first-in-human Phase 1/2a trial of VOR33 in AML patients in combination with Mylotarg by enrolling the first patient in the second quarter of 2021. We expect initial data from this trial to be reported in late 2021 or in the first half of 2022. If successful, this trial will provide important validating evidence of the potential of VOR33 and our broader eHSC approach, which we believe has significant potential to improve clinical outcomes for hematological malignancies beyond AML and change the standard of care. We are developing VOR33 as an eHSC product candidate to replace the standard of care in transplant settings. Once the VOR33 cells have engrafted, we believe patients can be treated with anti-CD33 therapies, such as Mylotarg or VCAR33, with limited on-target toxicity, leading to durable anti-tumor activity and potential cures. In preclinical studies, we have observed that the removal of CD33 provided robust protection of these healthy donor HSCs from the cytotoxic effects of CD33-directed companion therapeutics yet had no deleterious effects on the differentiation or function of hematopoietic cells.

VCAR33 is a CD33-directed chimeric antigen receptor ("CAR")-T therapy candidate designed to target CD33, a clinically-validated target for AML. We licensed VCAR33 from the National Institutes of Health ("NIH") and intend to initially develop VCAR33 as a bridge-to-transplant monotherapy for relapsed/refractory AML, where patients have failed prior lines of therapy and need further treatment to achieve morphologic remission and, if possible, subsequent HSCT. This setting typically sources T cells from the patient (autologous cells) and is the setting in which the National Marrow Donor Program ("NMDP") is currently evaluating a T cell therapy using the same CAR construct as VCAR33 in a multi-site Phase 1/2 clinical trial in young adult and pediatric patients with relapsed/refractory AML, with initial monotherapy proof-of-concept data expected in 2022, depending on the investigator's timing of data release. We expect to either assume sponsorship and oversight of the NMDP trial prior to its completion or enter into an agreement with the NMDP providing us with the right to cross-reference the trial results in future IND applications that we may submit to the FDA. In the event we cross-reference these trial results in an IND application for VCAR33, we will be required to demonstrate that VCAR33 is comparable to the T cell therapy studied in the NMDP trial, which will require us to show that our manufacturing processes and construct release specifications are sufficiently comparable to those employed in the NMDP trial. In determining comparability, we expect the FDA to evaluate whether and to what extent any changes in our process and specifications are likely to have an adverse effect on the quality, safety and efficacy of VCAR33 in comparison to the T cell therapy studied in the NMPD trial. We believe the T cell therapy being evaluated in the NMDP trial is

comparable to VCAR33 and that the trial, if successful, will support future clinical development of VCAR33. Therefore, unless the context requires otherwise, we refer to this program, collectively, as VCAR33. However, the FDA may reject our claim of comparability and the sufficiency of the data to support it, or disagree with our ability to reference the preclinical, manufacturing or clinical data generated by the NMDP trial, and as a result, we may be required to repeat certain development steps undertaken in the NMDP trial if VCAR33 is considered not comparable to its construct. See "Risk Factors—We have not successfully tested our product candidates in clinical trials and any favorable preclinical results are not predictive of results that may be observed in clinical trials."

We believe VOR33 and VCAR33 could be highly synergistic as a treatment system, potentially enabling prolonged remissions or cures in the post-transplant setting, which we refer to as the VOR33/VCAR33 Treatment System. We intend to investigate the VOR33/VCAR33 Treatment System, entailing VOR33 eHSC therapy followed by VCAR33 as a companion therapeutic, initially for transplant-eligible patients suffering from AML. We believe VCAR33 could be a potent anticancer therapy that, when combined with VOR33, could help obviate severe on-target myeloablative toxicities and unlock the efficacy potential of VCAR33. In addition, in this setting VCAR33 T cells could be sourced from the same cell source as VOR33 (allogeneic cells), which may provide benefits such as a healthier, more abundant cell source alongside lower risk of host T cells attacking CAR-T cells, thereby potentially prolonging persistence. We expect to submit an IND for the VOR33/VCAR33 Treatment System in the second half of 2022 following data from our first-in-human trial evaluating VOR33 and the NMDP-sponsored Phase 1/2 clinical trial studying VCAR33.

Leveraging our proprietary Vor platform, we are also assessing the potential of generating eHSCs in which the expression of other common surface targets has been removed, including targets such as CD123 and CLL-1. We are generating eHSCs in which these genes have been inactivated individually as well as multiplexed in combination with CD33. Additionally, we are conducting ongoing discovery efforts on undisclosed targets for non-myeloid malignancies including multiple myeloma and T cell malignancies. For additional details on the license from NIH, see the section titled "Business—License Agreements."

In contrast to other patient-specific cell therapies such as CAR-T cells and gene-modified allogeneic cell therapies, our manufacturing of eHSCs is a rapid and elegant process, with the gene modification step for VOR33 being completed in approximately three days. The primary reason we can produce eHSCs so quickly is the lack of a need for cell expansion. Our approach to creating eHSCs also does not involve the insertion of new genetic material, thereby avoiding complications related to the use of delivery modalities necessary for gene insertion, such as the viral vectors used in VCAR33 and other CAR-T therapies. The relatively simple and streamlined process of creating our eHSCs provides significant advantages in the required manufacturing infrastructure and resources, which we believe will translate into higher scalability and a lower cost of goods. We believe rapid manufacturing time will also maximize the clinical application of our eHSCs in routine transplant practice.

Since our inception in December 2015, we have devoted substantially all of our resources to raising capital, organizing and staffing our company, business and scientific planning, conducting discovery and research activities, acquiring or discovering product candidates, establishing and protecting our intellectual property portfolio, developing and progressing our product candidates and preparing for clinical trials, establishing arrangements with third parties for the manufacture of our product candidates and component materials, and providing general and administrative support for these operations. We do not have any product candidates approved for sale and have not generated any revenue from product sales. Through December 31, 2020, we funded our operations primarily through the sale of equity securities and debt financings and have received aggregate net proceeds from these transactions of approximately $112.3 million.

We have incurred significant operating losses since inception, including net losses of $43.3 million and $10.8 million for the years ended December 31, 2020 and 2019, respectively. As of December 31, 2020, we had an accumulated deficit of $61.2 million. We expect to continue to incur significant and increasing expenses and operating losses for the foreseeable future, particularly if and as we continue to invest in our research and development activities, expand our product pipeline, hire additional personnel, invest in and grow our business, maintain, expand and protect our intellectual property portfolio, and seek regulatory approvals for and commercialize any approved product candidates. In addition, we expect to incur additional costs associated with operating as a public company, including significant legal, audit, accounting, regulatory, tax-related, director and

officer insurance premiums, investor relations and other expenses that we did not incur as a private company. As a result, we will need substantial additional funding to support our continuing operations and pursue our growth strategy. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through the public or private sale of equity, government or private party grants, debt financings or other capital sources, including potential collaborations with other companies or other strategic transactions. If we are unable to obtain additional funding, we could be forced to delay, reduce or eliminate some or all of our research and development programs, product portfolio expansion or any commercialization efforts, which could adversely affect our business prospects, or we may be unable to continue operations. If we raise funds through strategic collaborations or other similar arrangements with third parties, we may have to relinquish valuable rights to our platform technology, future revenue streams, research programs or product candidates or may have to grant licenses on terms that may not be favorable to us and/or may reduce the value of our common stock. Our ability to raise additional funds may be adversely impacted by potential worsening global economic conditions and disruptions to and volatility in the credit and financial markets in the United States and worldwide resulting from the ongoing COVID-19 pandemic or other events. Because of the numerous risks and uncertainties associated with product development, we cannot predict the timing or amount of increased expenses or when or if we will be able to achieve or maintain profitability.

As of December 31, 2020, we had cash and cash equivalents of $48.5 million. In February 2020, we closed the second tranche of our Series A-2 preferred stock financing and sold and issued an aggregate of 44,375,000 shares at a purchase price of $0.40 per share, resulting in proceeds of $17.7 million, net of issuance costs. In June 2020, we completed a closing for the sale and issuance of an aggregate of 124,519,220 shares of our Series B preferred stock at a purchase price of $0.52 per share, resulting in proceeds of $64.5 million, net of issuance costs. In January 2021, we closed the second and final tranche of our Series B preferred stock financing, selling an aggregate of 87,259,605 additional shares of our Series B preferred stock at a purchase price of $0.52 per share (the “Series B Milestone Financing”) for aggregate proceeds of $45.4 million, net of issuance costs.

On February 9, 2021, we completed our IPO and sold 11,302,219 shares of our common stock, including 1,474,202 shares sold pursuant to the exercise of the underwriters’ over-allotment option, at a public offering price of $18.00 per share. We received net proceeds of approximately $186.3 million from the IPO, after deducting underwriters’ discounts and commissions and other offering expenses paid by us.

Business Impact of the COVID-19 Pandemic

The global COVID-19 pandemic continues to rapidly evolve, and we will continue to monitor the COVID-19 situation closely. To date our financial condition and operations have not been significantly impacted by the COVID-19 pandemic. However, we cannot, at this time, predict the specific extent, duration or full impact that the COVID-19 pandemic will have on our financial condition and operations, including our ongoing and planned preclinical and clinical trials. The extent of the impact of the COVID-19 on our business, operations and clinical development timelines and plans remains uncertain and will depend on certain developments, including the duration and spread of the outbreak and its impact on our clinical trial enrollment, trial sites, contract research organizations (“CROs”), third-party manufacturers, and other third parties with whom we do business, as well as its impact on regulatory authorities and our key scientific and management personnel. To the extent possible, we are conducting business as usual, with necessary or advisable modifications to employee travel as many of our employees are working remotely. We will continue to actively monitor the rapidly evolving situation related to COVID-19 and may take further actions that alter our operations, including those that may be required by federal, state or local authorities, or that we determine are in the best interests of our employees and other third parties with whom we do business. The development of our product candidates could be disrupted and materially adversely affected in the future by the COVID-19 pandemic. Our planned clinical trials also could be delayed due to government orders and site policies on account of the pandemic, and some patients may be unwilling or unable to travel to study sites, enroll in our trials or be unable to comply with clinical trial protocols if quarantines impede patient movement or interrupt healthcare services, which would delay our ability to conduct clinical trials or release clinical trial results and could delay our ability to obtain regulatory approval and commercialize our product candidates. Furthermore, COVID-19 could affect our employees or the employees of research sites and service providers on whom we rely, including CROs, as well as those of companies with which we do business, including our suppliers and contract manufacturing organizations (“CMOs”), thereby disrupting our business operations. Quarantines and travel

restrictions imposed by governments in the jurisdictions in which we and the companies with which we do business operate could materially impact the ability of employees to access preclinical and clinical sites, laboratories, manufacturing site and office. These and other events resulting from the COVID-19 pandemic could disrupt, delay, or otherwise adversely impact our business.

Financial Operations Overview

Revenue

We have not generated any revenue since our inception and do not expect to generate any revenue from the sale of products in the near future, if at all. If our development efforts for VOR33, VCAR33, the VOR33/VCAR33 Treatment System or any other product candidates are successful and result in marketing approval, or if we enter into collaboration or license agreements with third parties, we may generate revenue in the future from a combination of product sales or payments from such agreements.

Expenses

Research and Development Expenses

Research and development expenses consist primarily of external and internal costs incurred in connection with our research and development activities, including our drug discovery efforts and the development of VOR33 and VCAR33.

External expenses include:

- external research and development expenses incurred under agreements with CROs and other scientific development services;
- costs of other outside consultants, including their fees and related travel expenses;
- costs related to compliance with quality and regulatory requirements;
- costs of laboratory supplies and acquiring and developing preclinical and clinical trial materials, including expenses associated with our CMOs; and
- payments made under third party licensing agreements.

Internal expenses include:

- personnel-related expenses, including salaries, bonuses, benefits and stock-based compensation expenses, for individuals involved in research and development activities; and
- facilities, depreciation and other allocated expenses, which include direct and allocated expenses for rent, insurance and other internal operating costs.

We expense research and development costs as incurred. We recognize external development costs based on an evaluation of the progress to completion of specific tasks using information provided to us by our vendors. Payments for these activities are based on the terms of the individual agreements, which may differ from the pattern of costs incurred, and are reflected in our consolidated financial statements as prepaid expenses or accrued research and development expenses. Nonrefundable advance payments for goods or services to be received in the future for use in research and development activities are deferred and capitalized, even when there is no alternative future use for the research and development. The capitalized amounts are expensed as the related goods are delivered or the services are performed.

A significant portion of our research and development costs have been external costs, which we track by stage of development, preclinical or clinical. However, we do not track our internal research and development

expenses on a program specific basis because these costs are deployed across multiple projects and, as such, are not separately classified.

Research and development activities are central to our business model. We expect that our research and development expenses will increase significantly for the foreseeable future as we continue to identify and develop product candidates, particularly as more of our product candidates move into clinical development and later stages of clinical development.

The successful development of VOR33, VCAR33, the VOR33/VCAR33 Treatment System and any product candidates we may develop in the future is highly uncertain. Therefore, we cannot reasonably estimate or know the nature, timing and estimated costs of the efforts that will be necessary to complete the development and commercialization of any of our product candidates. We are also unable to predict when, if ever, material net cash inflows will commence from the sale of VOR33, VCAR33, the VOR33/VCAR33 Treatment System or potential future product candidates, if approved. This is due to the numerous risks and uncertainties associated with developing product candidates, many of which are outside of our control, including the uncertainty of:

- the timing and progress of preclinical and clinical development activities;
- the number and scope of preclinical and clinical programs we decide to pursue;
- our ability to maintain our current research and development programs and to establish new ones;
- establishing an appropriate safety profile with IND-enabling studies;
- the number of sites and patients included in the clinical trials;
- the countries in which the clinical trials are conducted;
- per patient trial costs;
- successful patient enrollment in, and the initiation of, clinical trials, as well as drop out or discontinuation rates, particularly in light of the current COVID-19 pandemic environment;
- the successful completion of clinical trials with safety, tolerability and efficacy profiles that are satisfactory to the FDA or any comparable foreign regulatory authority;
- the number of trials required for regulatory approval;
- the timing, receipt and terms of any regulatory approvals from applicable regulatory authorities;
- our ability to establish new licensing or collaboration arrangements;
- the performance of our future collaborators, if any;
- establishing commercial manufacturing capabilities or making arrangements with third-party manufacturers;
- significant and changing government regulation and regulatory guidance;
- the impact of any business interruptions to our operations or to those of the third parties with whom we work, particularly in light of the current COVID-19 pandemic environment;
- obtaining, maintaining, defending and enforcing patent claims and other intellectual property rights;
- launching commercial sales of our product candidates, if approved, whether alone or in collaboration with others; and
- maintaining a continued acceptable safety profile of the product candidates following approval.

Any changes in the outcome of any of these variables could mean a significant change in the costs and timing associated with the development of our product candidates. For example, if the FDA or another regulatory authority were to require us to conduct clinical trials beyond those that we anticipate will be required for the

completion of clinical development of a product candidate, or if we experience significant delays in our clinical trials due to patient enrollment or other reasons, we would be required to expend significant additional financial resources and time on the completion of clinical development. We may never obtain regulatory approval for any of our product candidates.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel-related costs, including salaries, bonuses, benefits and stock-based compensation expenses for individuals involved in our executive, finance, corporate, business development and administrative functions, as well as expenses for outside professional services, including legal, audit, accounting and tax-related services and other consulting fees, facility-related expenses, which include depreciation costs and other allocated expenses for rent and maintenance of facilities, insurance costs, recruiting costs, travel expenses and other general administrative expenses.

We expect that our general and administrative expenses will increase significantly for the foreseeable future as our business expands and we hire additional personnel to support our continued research and development activities, including our future clinical programs. We also anticipate increased expenses associated with being a public company, including costs for legal, audit, accounting, investor and public relations, regulatory and tax-related services related to compliance with the rules and regulations of the Securities and Exchange Commission (the "SEC"), listing standards applicable to companies listed on a national securities exchange, director and officer insurance premiums and investor relations costs.

Other Income (Expense)

Interest Income

Interest income consists of interest income earned on our cash and cash equivalents held in financial institutions.

Interest Expense Related to Convertible Notes

Interest expense relates to interest incurred on the convertible notes we issued between October 2016 and December 2018 (the "Convertible Notes"), as well as amortization of the related note discount which converted to shares of Series A-2 Preferred Stock in February 2019 (see Note 6 to our audited consolidated financial statements included elsewhere in this in this Annual Report for additional information).

Change in Fair Value of Derivative Liabilities

Change in fair value of derivative liabilities relates to the bifurcated embedded derivative liabilities identified associated with the Convertible Notes.

Results of Operations

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 (in thousands):

	Year Ended December 31,		
	2020	2019	Change
Operating expenses:			
Research and development	$ 31,618	$ 6,200	25,418
General and administrative	11,748	4,217	7,531
Total operating expenses	43,366	10,417	32,949
Loss from operations	(43,366)	(10,417)	(32,949)
Other income (expense):			
Interest income	29	154	(125)
Interest expense related to convertible notes	—	(608)	608
Change in fair value of derivative liabilities	—	32	(32)
Total other income (expense)	29	(422)	451
Net loss	$ (43,337)	$ (10,839)	$ (32,498)

Research and Development Expenses

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

	Year Ended December 31,		
	2020	2019	Change
External costs[1]	$ 18,189	$ 3,278	$ 14,911
Internal costs:			
Personnel expenses (including stock-based compensation)	10,209	2,051	8,158
Facilities and other expenses	3,220	871	2,349
Total research and development	$ 31,618	$ 6,200	$ 25,418

(1) In future periods when clinical trial expenses are incurred, we expect that external costs will be broken out between our clinical programs and our preclinical programs.

Research and development expenses were approximately $31.6 million for the year ended December 31, 2020, compared to $6.2 million for the year ended December 31, 2019. The increase of approximately $25.4 million was primarily due to an increase of $14.9 million in external preclinical studies, research consulting fees, and laboratory supplies costs and an increase of $8.2 million in personnel costs primarily attributable to an increase in employee headcount to support the growth of our research and development efforts. Additionally, facilities and other expenses increased by approximately $2.3 million primarily due to increases in rent and depreciation expense.

General and Administrative Expenses

General and administrative expenses were approximately $11.7 million for the year ended December 31, 2020, compared to approximately $4.2 million for the year ended December 31, 2019. The increase of approximately $7.5 million was primarily due to an increase of $3.8 million in personnel costs attributable to increased employee headcount to support the growth of our research and development organization, an increase of $2.4 million in professional fees primarily attributable to legal and outside consultant costs and an increase of $1.3 million in facilities and other expenses primarily due to increases in rent expense and purchases of office equipment and supplies.

Other Income (Expense)

Other income (expense) changed by $0.5 million from other expense of $0.4 million for the year ended December 31, 2019 to other income of $29,000 for the year ended December 31, 2020. The change was primarily attributable to a $0.6 million decrease in interest expense incurred on the Convertible Notes offset by a decrease of $0.1 million in interest income related to interest earned on our cash and cash equivalents.

Liquidity and Capital Resources

Sources of Liquidity

Since our inception, we have not recognized any revenue and have incurred operating losses and negative cash flows from our operations. We have not yet commercialized any product and we do not expect to generate revenue from sales of any products for several years, if at all. Since our inception, we have funded our operations primarily through the sale of equity securities and debt financings and have received aggregate net proceeds from these transactions of approximately $112.3 million as of December 31, 2020.

In January 2021, we completed the Series B Milestone Financing, selling an aggregate of 87,259,605 additional shares of our Series B preferred stock at a purchase price of $0.52 per share for aggregate net proceeds of $45.4 million.

On February 9, 2021, we completed our IPO and sold 11,302,219 shares of our common stock, including 1,474,202 shares sold pursuant to the exercise of the underwriters' over-allotment option, at a public offering price of $18.00 per share. We received net proceeds of approximately $186.3 million from the IPO, after deducting underwriters' discounts and other offering expenses paid by us.

Funding Requirements

As of December 31, 2020, we had cash and cash equivalents of $48.5 million. We will need to raise additional capital in the future to fund our future operations. However, we cannot guarantee that we will be able to obtain sufficient additional funding or that if we do obtain additional funding, that such funding, will be obtainable on terms satisfactory to us. In the event that we are unable to obtain sufficient additional funding, there can be no assurance that we will be able to continue as a going concern.

We expect that the net proceeds from our IPO and the Series B Milestone Financing, together with our existing cash and cash equivalents at December 31, 2020, will enable us to fund our operating expenses and capital expenditure requirements into the first quarter of 2023. We have based this estimate on assumptions that may prove to be wrong and we could exhaust our capital resources sooner than we expect.

We expect our expenses to increase substantially if, and as, we:

- initiate and continue research and preclinical and clinical development of our product candidates, including in particular our clinical trials for VOR33 and VCAR33;
- incur third party manufacturing costs to support our preclinical studies and clinical trials of our product candidates and, if approved, their commercialization;
- seek to identify and develop additional product candidates;
- make investments in our platform, including the costs of developing internal manufacturing capabilities;
- seek regulatory and marketing approvals for our product candidates;
- establish a sales, marketing and distribution infrastructure to commercialize any approved product candidates;

- adapt our regulatory compliance efforts to incorporate requirements to applicable marketed products;
- acquire or in-license products, product candidates, technologies;
- maintain, expand, enforce, defend and protect our intellectual property;
- hire additional clinical, quality control, manufacturing and other scientific personnel;
- add operational, financial and management information systems and personnel; and
- experience any delays or encounter any issues with any of the above, including as a result of the ongoing COVID-19 pandemic.

In addition, we expect to incur additional costs associated with operating as a public company, including significant legal, audit, accounting, investor and public relations, regulatory, tax-related, director and officer insurance premiums, investor relations and other expenses that we did not incur as a private company. Developing pharmaceutical products, including conducting preclinical studies 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 for any product candidates or generate revenue from the sale of any product candidate for which we may obtain marketing approval. In addition, our product candidates, if approved, may not achieve commercial success. Our commercial revenues, if any, will be derived from sales of drugs that we do not expect to be commercially available for at least several years, if ever.

As a result, we will need substantial additional funding to support our continuing operations and pursue our growth strategy. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through the public or private sale of equity, government or private party grants, debt financings or other capital sources, including potential collaborations with other companies or other strategic transactions. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interest of our shareholders will be or could be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our stockholders. Debt financing and equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we are unable to obtain additional funding, we could be forced to delay, reduce or eliminate some or all of our research and development programs, product portfolio expansion or any commercialization efforts, which could adversely affect our business prospects, or we may be unable to continue operations. If we raise funds through strategic collaborations or other similar arrangements with third parties, we may have to relinquish valuable rights to our platform technology, future revenue streams, research programs or product candidates or may have to grant licenses on terms that may not be favorable to us and/or may reduce the value of our common stock. Our ability to raise additional funds may be adversely impacted by potential worsening global economic conditions and disruptions to and volatility in the credit and financial markets in the United States and worldwide resulting from the ongoing COVID-19 pandemic or otherwise. Because of the numerous risks and uncertainties associated with product development, we cannot predict the timing or amount of increased expenses, and there is no assurance that we will ever be profitable or generate positive cash flow from operating activities.

Cash Flows

The following table provides information regarding our cash flows for the periods presented (in thousands):

	Year Ended December 31,	
	2020	2019
Net cash used in operating activities	$ (36,292)	$ (9,855)
Net cash used in investing activities	(4,161)	(748)
Net cash provided by financing activities	82,526	17,699
Net increase in cash, cash equivalents and restricted cash	42,073	$ 7,096

Net cash used in operating activities was approximately $36.3 million for the year ended December 31, 2020, reflecting a net loss of approximately $43.3, partially offset by a net change of $4.3 million in our net operating assets and non-cash charges of $2.7 million. The non-cash charges primarily consisted of stock-based compensation expense of $1.3 million, non-cash lease expense of $0.8 million and depreciation expense of $0.6 million. The change in our net operating assets and liabilities was primarily due to an increase in accounts payable of $5.8 million, an increase in other assets of $2.5 million and an increase in operating lease liability of $0.4 million. These increases were offset by a decrease in prepaid expenses and other current assets of $0.6 million.

Net cash used in operating activities was approximately $9.9 million for the year ended December 31, 2019, reflecting a net loss of $10.8 million, partially offset by a net change of $0.1 million in our net operating assets and non-cash charges of $0.8 million. The non-cash charges primarily consisted of non-cash interest expense of $0.6 million and stock-based compensation expense $0.2 million. The change in our net operating assets and liabilities was primarily due to an increase in accounts payable and accrued expenses of $1.2 million, partially offset by an increase in prepaid expenses and other current assets of $1.1 million.

The approximately $26.4 million increase in cash used in operating activities for the year ended December 31, 2020 compared to the year ended December 31, 2019 was primarily due to an increase in operating expenses as a result of our increased efforts towards identifying product candidates and advancing the development of VOR33, including increased personnel costs related to our increased headcount.

Investing Activities Net cash used in investing activities was approximately $4.2 million for the year ended December 31, 2020, which was primarily due to purchases of property and equipment. Net cash used in investing activities was $0.7 million for the year ended December 31, 2019, which was primarily due to purchases of property and equipment.

Financing Activities

Net cash provided by financing activities was approximately $82.5 million for the year ended December 31, 2020, which was primarily due to proceeds received from the issuance of shares of our preferred stock. Net cash provided by financing activities was $17.7 million for the year ended December 31, 2019, consisting primarily of proceeds from the issuance of shares of our preferred stock.

Contractual Obligations and Other Commitments

In December 2019, we entered into an operating lease for corporate office and laboratory space in Cambridge, Massachusetts, and began occupying the space in June 2020 under a lease agreement that expires in June 2030. Future minimum lease commitments under this lease through June 2030 are $28.0 million. In March 2020, we entered into an operating lease for certain animal care space in Cambridge, Massachusetts, and began occupying the space in April 2020 under a lease agreement that expires in March 2022. Future minimum lease commitments under this lease through March 22 are $0.3 million.

We have entered into license agreements with certain parties. Such arrangements require ongoing payments, including payments upon the achievement of certain development, regulatory and commercial milestones, receipt of sublicense income, as well as royalties on commercial sales. Payments under these arrangements are expensed as incurred. During the year ended December 31, 2020, we incurred expenses of $0.1 million in milestone payments under our license agreement with the Trustees of Columbia University in the City of New York. We also incurred $0.4 million in license issue fees associated with our license with the National Cancer Institute of the National Institutes of Health during the year ended December 31, 2020. This summary does not include payments that may become due under these agreements as they are cancellable at will with 90 days' notice.

We also have agreements with certain vendors for various services, including services related to clinical operations and support, which we are not contractually able to terminate for convenience and avoid any and all future obligations to the vendors. Under such agreements, we are contractually obligated to make certain payments to vendors to reimburse them for their unrecoverable outlays incurred prior to cancellation. The exact amounts of

such obligations are dependent on the timing of termination and the exact terms of the relevant agreement and cannot be reasonably estimated. We do not include these payments in this summary as they are not fixed and estimable.

Critical Accounting Policies and Significant Judgments and Estimates

Our management's discussion and analysis of financial condition and results of operations is based on our consolidated financial statements. Our consolidated financial statements are prepared in accordance with generally accepted accounting principles in the United States. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, costs 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 audited consolidated financial statements included elsewhere in this Annual Report, 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

As part of the process of preparing our consolidated financial statements, we are required to estimate our accrued research and development expenses as of each balance sheet date. This process involves reviewing open contracts and purchase orders, communicating with our applicable personnel to identify services that have been performed on our behalf and 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. The majority of our service providers invoice us in arrears for services performed, on a pre-determined schedule or when contractual milestones are met; however, some require advance payments. We make estimates of our accrued expenses as of each balance sheet date in the 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.

Determination of the Fair Value of Equity-Based Awards

We measure stock options and other stock-based awards granted to directors, employees and non-employees based on their fair value on the date of the grant and recognize the corresponding compensation expense of those awards over the requisite service period, which is generally the vesting period of the respective award. We have only issued stock options and restricted share awards with service-based vesting conditions and record the expense for these awards using the straight-line method. We determine the fair value of restricted stock awards granted based on the fair value of our common stock. We estimate the fair value of stock option awards granted using the Black-Scholes option-pricing model, which uses as inputs the fair value of our common stock and subjective assumptions we make, including the expected stock price volatility, the expected term of the award, the risk-free interest rate and expected dividends.

Due to the lack of a public market for the trading of our common stock prior to our IPO, and a lack of company-specific historical and implied volatility data, we base the estimate of expected volatility on the historical volatility of a representative group of publicly traded companies for which historical information is available. The historical volatility is generally calculated based on a period of time commensurate with the expected term assumption. We use the simplified method to calculate the expected term for options granted to employees and directors. We utilize this method as we do not have sufficient historical exercise data to provide a reasonable basis upon which to estimate the expected term. For grants to non-employees, ASU 2018-07 allows entities to use the expected term to measure non-employee options or elect to use the contractual term as the expected term, on an award-by-award basis. The risk-free interest rate is based on a U.S. treasury instrument whose term is consistent

with the expected term of the stock options. The expected dividend yield is assumed to be zero as we have never paid dividends and do not have current plans to pay any dividends on our common stock.

Prior to the IPO, as there had been no public market for our common stock, the estimated fair value of our common stock had 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 valuations of common stock, and our board of directors assessment, with input from management, of additional objective and subjective factors that we believed were relevant and which may have changed from the date of the most recent valuation through the date of the grant. These independent third-party valuations were performed in accordance with the guidance outlined in the American Institute of Certified Public Accountants' Accounting and Valuation Guide, Valuation of Privately-Held-Company Equity Securities Issued as Compensation.

Given the absence of a public trading market, our board of directors with input from management considered numerous objective and subjective factors to determine the fair value of common stock. The factors included, but were not limited to:

- contemporaneous valuations performed by an independent third-party valuation firm;
- our stage of development and material risks related to our business;
- the progress of our research and development programs, including the status and results of preclinical studies and clinical trials for our product candidates;
- our business conditions and projections;
- sales of our redeemable convertible preferred stock;
- the rights, preferences and privileges of our redeemable convertible preferred stock relative to those of our common stock;
- lack of marketability of our common and redeemable convertible preferred stock as a private company;
- our operating results and financial performance;
- the likelihood of achieving a liquidity event, such as an initial public offering or sale of our company, in light of prevailing market conditions;
- the trends, developments and conditions in the life sciences and biotechnology industry sectors;
- analysis of initial public offerings and the market performance and stock price volatility of similar public companies in the life sciences and biopharmaceutical sectors; and
- the economy in general.

For our valuations performed through June 30, 2020, in accordance with the Practice Aid, we determined the Option Pricing Method (“OPM”) was the most appropriate method for determining the fair value of our common stock based on our stage of development and other relevant factors. The OPM uses a market approach to estimate our enterprise value. The OPM treats common stock and redeemable convertible preferred stock 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 to stockholders exceeded the value of the redeemable convertible preferred stock liquidation preferences at the time of the liquidity event, such as a strategic sale or a merger. A discount for lack of marketability of the common stock is then applied to arrive at an indication of value for the common stock.

For our valuations performed after June 30, 2020 through December 31, 2020, in accordance with the Practice Aid, we determined the hybrid method was the most appropriate method for determining the fair value of our common stock based on our stage of development and other relevant factors. The hybrid method also uses a market approach to estimate our enterprise value. It is a probability-weighted expected return method (“PWERM”), where the equity value in one or more scenarios is calculated using an OPM. The PWERM is a scenario-based

methodology that estimates the fair value of our common stock based upon an analysis of our future values, assuming various outcomes. The common stock value is based on the probability-weighted present value of expected future investment returns considering each of the possible outcomes available as well as the rights of each class of stock. The future value of the common stock under each outcome is discounted back to the valuation date at an appropriate risk-adjusted discount rate and probability weighted to arrive at an indication of value for the common stock.

The assumptions underlying these valuations represented management's best estimates, which involved inherent uncertainties and the application of management judgment. As a result, if factors or expected outcomes change and we used significantly different assumptions or estimates, our equity-based compensation expense could have been materially different.

See Note 9 to our audited consolidated financial statements included elsewhere in this Annual Report for information concerning certain of the specific assumptions we used in applying the Black-Scholes option pricing model to determine the estimated fair value of our stock options granted in the years ended December 31, 2020 and 2019.

Following completion of the IPO on February 9, 2021, it will no longer be necessary for our board of directors to estimate the fair value of our common stock in connection with our accounting for granted stock options and other such awards we may grant, as the fair value of our common stock will be determined based on the quoted market price of our common stock.

Recent Accounting Pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position and results of operations is disclosed in Note 2 to our audited consolidated financial statements included in this Annual Report.

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 SEC.

Emerging Growth Company and Smaller Reporting Company Status

In April 2012, the JOBS Act was enacted. Section 107 of the JOBS Act provides that an “emerging growth company” can take advantage of the extended transition period provided in Section 7(a)(2)(B) of the Securities Act of 1933, as amended, for complying with new or revised accounting standards. Thus, an emerging growth company can delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We elected the extended transition period for complying with new or revised accounting standards, which delays the adoption of these accounting standards until they would apply to private companies.

In addition, as an emerging growth company, we may take advantage of specified reduced disclosure and other requirements that are otherwise applicable generally to public companies. These provisions include:

- being permitted to present only two years of audited consolidated financial statements in addition to any required unaudited interim consolidated financial statements, with correspondingly reduced disclosure in the section titled “Management’s Discussion and Analysis of Financial Condition and Results of Operations”;
- an exception from compliance with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- reduced disclosure about our executive compensation arrangements in our periodic reports, proxy statements and registration statements;

- exemptions from the requirements of holding non-binding advisory votes on executive compensation or golden parachute arrangements; and
- an exemption from compliance with the requirements of the Public Company Accounting Oversight Board regarding the communication of critical audit matters in the auditor's report on consolidated financial statements.

We may take advantage of these provisions until the last day of the fiscal year ending after the fifth anniversary of our initial public offering or such earlier time that we no longer qualify as an emerging growth company. We will cease to qualify as an emerging growth company on the date that is the earliest of: (i) the last day of our fiscal year following the fifth anniversary of the date of the completion of our initial public offering; (ii) the last day of the fiscal year in which we have more than $1.07 billion in total annual gross revenues; (iii) the date on which we are deemed to be a "large accelerated filer" under the rules of the SEC, which means the market value of our common stock that is held by non-affiliates exceeds $700 million as of the prior June 30th and we have been a public company for at least 12 months and have filed one annual report on Form 10-K; or (iv) the date on which we have issued more than $1.0 billion of non-convertible debt over the prior three-year period. We may choose to take advantage of some but not all of these reduced reporting burdens. We have taken advantage of certain reduced reporting requirements in this this Annual Report. Accordingly, the information contained herein may be different than you might obtain from other public companies in which you hold equity interests.

We are also a "smaller reporting company." 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 consolidated financial statements in our Annual Report and, similar to emerging growth companies, smaller reporting companies have reduced disclosure obligations regarding executive compensation.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Interest Rate Risk

Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates, particularly because our cash equivalents are in the form of money market funds that are invested in U.S. Treasury securities. Interest income is sensitive to changes in the general level of interest rates. However, due to the short-term maturities of our cash equivalents, we believe a hypothetical 100 basis point increase or decrease in interest rates during any of the periods presented would not have had a material impact on our financial statements included elsewhere in this Annual Report on Form 10-K ("Annual Report").

As of December 31, 2020, we had no debt outstanding and are therefore were not exposed to related interest rate risk.

Foreign Currency Exchange Risk

All of our employees and our operations are currently located in the United States and our expenses are generally denominated in U.S. dollars. We therefore are not currently exposed to significant market risk related to changes in foreign currency exchange rates. However, we have contracted with and may continue to contract with non-U.S. vendors who we may pay in local currency. Our operations may be subject to fluctuations in foreign currency exchange rates in the future. To date, foreign currency transaction gains and losses have not been material to our financial statements, and we have not had a formal hedging program with respect to foreign currency. We believe a hypothetical 100 basis point increase or decrease in exchange rates during any of the periods presented would not have a material effect on our financial statements included elsewhere in this Annual Report.

Effects of Inflation

Inflation generally affects us by increasing our cost of labor and clinical trial costs. We believe that inflation has not had a material effect on our financial statements included elsewhere in this Annual Report.

Item 8. Financial Statements and Supplementary Data.

The financial statements required to be filed pursuant to this Item 8 are appended to this Annual Report on Form 10-K. An index of those financial statements is found in Item 15, Exhibits and Financial Statement Schedules, of this Annual Report on Form 10-K.

Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2020. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934 (the "Exchange Act"), means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and our management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of December 31, 2020, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Management's Report on Internal Control over Financial Reporting

This Annual Report on Form 10-K does not include a report of management's assessment regarding internal control over financial reporting or an attestation report of our registered public accounting firm due to a transition period established by rules of the SEC for newly public companies.

Changes in Internal Control over Financial Reporting.

There were no changes in our internal control over financial reporting that occurred during our most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The following table provides information regarding our current executive officers, other key employees and directors, including their ages as of March 17, 2021:

Name	Age	Position(s)
Executive Officers		
Robert Ang, M.B.B.S., M.B.A.	46	President, Chief Executive Officer and Director
Tirtha Chakraborty, Ph.D.	48	Chief Scientific Officer
Nathan Jorgensen, Ph.D., M.B.A.	44	Chief Financial Officer
Sadik Kassim, Ph.D.	40	Chief Technology Officer
Christopher Slapak, M.D.	62	Chief Medical Officer
Non-Employee Directors		
Kush Parmar, M.D., Ph.D.(1)	40	Chair of the Board of Directors
Daniella Beckman(2)(3)	42	Director
David C. Lubner(2)	56	Director
Sven (Bill) Ante Lundberg, M.D.(3)	57	Director
Matthew Patterson(1)(2)	49	Director
Joshua Resnick, M.D.(1)(3)	46	Director

(1) Member of the nominating and corporate governance committee.
(2) Member of the audit committee.
(3) Member of the compensation committee.

Executive Officers

Robert Ang, M.B.B.S., M.B.A., has served as our Chief Executive Officer and a member of our board of directors since August 2019. Prior to that, Dr. Ang served as Chief Business Officer at Neon Therapeutics Inc., a biopharmaceutical company, from October 2015 until August 2019, and as Senior Vice President, Business Development at Bavarian Nordic A/S, an immuno-oncology and infectious disease vaccine company, from 2013 to 2015. Dr. Ang received an M.B.B.S. medical degree from the University of Western Australia and an M.B.A. from Columbia University. We believe that Dr. Ang is qualified to serve on our board of directors due to his service as our President and Chief Executive Officer and his experience in the field of medicine and clinical drug development.

Tirtha Chakraborty, Ph.D., has served as our Chief Scientific Officer since November 2020 and previously as our Vice President, Head of Research starting in October 2019. From October 2018 to October 2019, Dr. Chakraborty served as Vice President of Cell Therapy Research at Sana Biotechnology, Inc., a biotechnology company. Prior to that, Dr. Chakraborty served as an Executive Director and Head of Hematology at CRISPR Therapeutics AG, a biotechnology company, from 2015 to October 2018. Dr. Chakraborty received a Ph.D. from Tata Institute of Fundamental Research and completed his post-doctoral associateship at Harvard Medical School.

Nathan Jorgensen, Ph.D., ***M.B.A.***, has served as our Chief Financial Officer since May 2020. From August 2016 to April 2020, Dr. Jorgensen led global healthcare investments for Qatar Investment Authority, the sovereign wealth fund for the State of Qatar. Dr. Jorgensen served as investment analyst at Calamos Investments, a global investment firm, from 2013 to August 2016. Dr. Jorgensen received a Ph.D. from the University of Minnesota and an M.B.A. from Cornell University Johnson Graduate School of Management.

Sadik Kassim, Ph.D., has served as our Chief Technology Officer since September 2019. From January 2019 to September 2019, Dr. Kassim served as Executive Director, Process Design of Kite Pharma. Dr. Kassim served in roles of increasing responsibility at Mustang Bio from February 2017 to January 2019, including most recently as Chief Scientific Officer. From 2014 to February 2017, Dr. Kassim served as Head of Early Analytical

Development at Novartis in its cell and gene therapies unit. Dr. Kassim received a B.S. in cell and molecular biology from Tulane University and a Ph.D. in microbiology and immunology from Louisiana State University. Dr. Kassim completed a post-doctoral fellowship in the Gene Therapy Program at the University of Pennsylvania.

Christopher Slapak, M.D., has served as our Chief Medical Officer since July 2020 and previously served in a consulting role as our Chief Medical Officer from July 2019 to July 2020. From January 2018 to July 2020, Dr. Slapak provided oncology consulting services to pharmaceutical companies, including Takeda Oncology and Translational Drug Development, Inc. From July 2018 to June 2019, Dr. Slapak served in a consulting role as Chief Medical Officer for Prelude Therapeutics, Inc., a precision oncology company. Dr. Slapak served in roles of increasing responsibility at Eli Lilly and Company from 1996 to December 2017, including most recently as Vice President, Early Phase Development Oncology. Dr. Slapak is also a clinical associate professor of medicine and clinical pharmacology at the Indiana University School of Medicine. Dr. Slapak received a B.S. in chemistry from The Ohio State University and an M.D. from the University of Chicago Pritzker School of Medicine.

Non-Employee Directors

Kush Parmar, M.D., Ph.D., has served as a member of our board of directors since February 2019, the chairman of our board of directors since January 2021 and served as our interim President and Chief Executive Officer from February 2019 until August 2019. Dr. Parmar is currently a Member of 5AM Venture Management, LLC, where he has worked since 2010, and is Co-Chief Executive Officer and member of the board of directors of 5:01 Acquisition Corp, positions he has held since its inception in August 2020. Dr. Parmar has served on the boards of directors of Homology Medicines, Inc. and Akouos, Inc. since December 2015 and October 2017, respectively, and previously served on the board of directors of Arvinas, Inc. from 2013 to November 2019, Audentes Therapeutics, Inc. (“Audentes”) from 2013 to November 2018 and scPharmaceuticals, Inc. from March 2014 to July 2018. Dr. Parmar received an A.B. in molecular biology and medieval studies from Princeton University, a Ph.D. in experimental pathology from Harvard University and an M.D. from Harvard Medical School. We believe that Dr. Parmar is qualified to serve on our board of directors due to his extensive experience in the venture capital industry, medical and scientific background and training, and service on the boards of other public and private biopharmaceutical and biotechnology companies.

Daniella Beckman has served as a member of our board of directors since July 2020. Since September 2019, she has served as the Chief Financial Officer of Tango Therapeutics, a targeted oncology biotechnology company. From November 2015 to September 2019, she provided consulting services and served as the Interim Chief Financial Officer for several early-stage biotechnology companies. Ms. Beckman has served on the board of directors and is a member of the audit committee of Translate Bio, Inc., a clinical-stage mRNA therapeutics company, since October 2017, and on the board of directors of 5:01 Acquisition Corp, a special purpose acquisition company, since October 2020. Ms. Beckman received a B.S. in business administration-accounting from Boston University. She is also a certified public accountant in Massachusetts. We believe that Ms. Beckman is qualified to serve on our board of directors due to her financial expertise and her experience in public accounting in the life sciences industry.

David C. Lubner has served as a member of our board of directors since July 2020. From January 2016 to June 2020, Mr. Lubner served as the Executive Vice President and Chief Financial Officer of Ra Pharmaceuticals, a biotechnology company acquired by UCB S.A. in April 2020. Mr. Lubner has served on the boards of directors of Dyne Therapeutics, Inc., a biotechnology company, and Therapeutics Acquisition Corp., a special purpose acquisition company, since March 2020 and July 2020, respectively, and previously served as a member of the board of directors of Nightstar Therapeutics plc, a gene therapy company, from July 2017 until it was acquired by Biogen Inc in June 2019. Mr. Lubner received a B.S. in business administration from Northeastern University and an M.S. in taxation from Bentley University. Mr. Lubner is also a member of the American Institute of Certified Public Accountants and is a certified public accountant in Massachusetts. We believe Mr. Lubner is qualified to serve on our board of directors due to his financial and accounting experience and his service as a director and executive officer of other biotechnology companies.

Sven (Bill) Ante Lundberg, M.D., has served as a member of our board of directors since March 2019. Since December 2019, he has served as President, Chief Executive Officer and Principal Financial Officer, and Executive

Director of Merus N.V., a clinical-stage immune-oncology company. From 2015 to February 2018, Dr. Lundberg was Chief Scientific Officer of CRISPR Therapeutics AG, a biotechnology company. Dr. Lundberg received an M.D. from Stanford University and an M.B.A. from the University of Massachusetts. He completed post-doctoral training at the Whitehead Institute/MIT and clinical training in Medicine and Medical Oncology from Harvard and the Dana-Farber Cancer Institute. We believe that Dr. Lundberg is qualified to serve on our board of directors due to his experience in the field of medicine and clinical drug development as well as his leadership and business experience.

Matthew Patterson has served as a member of our board of directors since October 2020. Mr. Patterson is the co-founder of, and currently serves as a Strategic Advisor for Audentes. From 2012 to January 2020, he served as Chief Executive Officer of Audentes until its acquisition by Astellas Pharma, Inc. Mr. Patterson has served as a member of the board of directors of the Alliance for Regenerative Medicine, an international advocacy organization representing the gene and cell therapy and broader regenerative medicine sector, since 2015, including as chair since January 2019. He has also served on the board of directors of Homology Medicines, Inc., a gene therapy company, and 5:01 Acquisition Corp, a special purpose acquisition company, since January 2018 and October 2020, respectively, and as the executive chairman of the board of directors of Remix Therapeutics, Inc., a private biotechnology company, since March 2021. Mr. Patterson received a B.A. in Biochemistry from Bowdoin College. We believe that Mr. Patterson is qualified to serve on our board of directors due to his expertise in the fields of business, biotechnology and drug development.

Joshua Resnick, M.D., has served as a member of our board of directors since February 2019. Dr. Resnick currently serves as a Managing Director at RA Capital Management, a position he has held since October 2018. Dr. Resnick previously served as a Partner at SV Health Investors from January 2016 to September 2018 and as President and Managing Partner at MRL Ventures Fund, an early-stage therapeutics-focused corporate venture fund that he built and managed within Merck & Co., from 2014 to January 2016. Dr. Resnick is on staff in the Department of Emergency Medicine at Massachusetts General Hospital. Dr. Resnick served on the boards of directors of Kalvista Pharmaceuticals, Inc. and Avrobio, Inc. from November 2016 to September 2018 and July 2016 to September 2018, respectively. Dr. Resnick received a B.A. in chemistry from Williams College, an M.D. from the University of Pennsylvania School of Medicine and an M.B.A. from The Wharton School of Business. We believe that Dr. Resnick is qualified to serve on our board of directors due to his experience as a biopharmaceutical and biotechnology public and private company investor.

Family Relationships

There are no family relationships among any of our directors or executive officers.

Audit Committee

Our audit committee consists of Daniella Beckman, David C. Lubner and Matthew Patterson, with Daniella Beckman serving as chair of the audit committee. Our board of directors has determined that each of these individuals meets the independence requirements of Rule 10A-3 under the Securities Exchange Act, as amended (the “Exchange Act”), and the Nasdaq Listing Rules. Each member of our audit committee can read and understand fundamental financial statements in accordance with Nasdaq audit committee requirements. Our board of directors has also determined that Daniella Beckman qualifies as an audit committee financial expert within the meaning of SEC regulations and meets the financial sophistication requirements of the Nasdaq Listing Rules. In arriving at these determinations, the board has examined each audit committee member’s scope of experience and the nature of their prior and/or current employment.

The functions of our audit committee include, among other things:

- helping our board of directors oversee our corporate accounting and financial reporting processes;
- managing the selection, engagement, qualifications, independence and performance of a qualified firm to serve as the independent registered public accounting firm to audit our financial statements;

- discussing the scope and results of the audit with the independent registered public accounting firm, and reviewing, with management and the independent accountants, our interim and year-end operating results;
- developing procedures for employees to submit concerns anonymously about questionable accounting or audit matters;
- reviewing related person transactions; and
- approving or, as permitted, pre-approving, audit and permissible non-audit services to be performed by the independent registered public accounting firm.

We believe that the composition and functioning of our audit committee will comply with all applicable SEC and Nasdaq rules and regulations. We intend to comply with future requirements to the extent they become applicable to us.

Delinquent Section 16(a) Reports

Section 16(a) of the Exchange Act requires our directors, executive officers and beneficial owners of more than 10% of our common stock to file reports of holdings and transactions in our common stock and other securities of our company with the Securities and Exchange Commission. Our directors, executive officers and beneficial owners of more than 10% of our common stock did not become subject to such Section 16(a) reporting requirements until February 4, 2021, after the completion of our fiscal year ended December 31, 2020.

Code of Business Conduct and Ethics

We have adopted a Code of Business Conduct and Ethics (the "Code of Conduct") applicable to all of our employees, executive officers and directors. This includes our principal executive officer, principal financial officer and principal accounting officer or controller, or persons performing similar functions. A copy of the Code of Conduct is available on our website at *www.vorbio.com*. We intend to post on our website all disclosures that are required by law or the listing standards of the Nasdaq Stock Market concerning any amendments to, or waivers from, any provision of the Code of Conduct.

Stockholder Communications with the Board of Directors

Our board of directors has adopted a formal process by which stockholders may communicate with the board or any of its directors. Stockholders who wish to recommend individuals for consideration to become nominees for election to the board at an annual meeting of stockholders must do so by delivering a written recommendation to the Nominating and Corporate Governance Committee c/o Vor Biopharma Inc., 100 Cambridgepark Dr., Suite 400, Cambridge, MA 02140, Attn: Corporate Secretary. Each submission must set forth: the name and address of the stockholder on whose behalf the submission is made; the number and class of our shares that are owned beneficially by such stockholder as of the date of the submission; the full name of the proposed candidate; a description of the proposed candidate's business experience for at least the previous five years; complete biographical information for the proposed candidate; and a description of the proposed candidate's qualifications as a director. Any such submission must be accompanied by the written consent of the proposed candidate to be named as a nominee and to serve as a director if elected. All written submissions received from stockholders that include the information described above will be reviewed by the committee at its next appropriate meeting.

Item 11. Executive Compensation.

Our named executive officers for the year ended December 31, 2020 consist of our principal executive officer, Robert Ang, our President and Chief Executive Officer, and our next two most highly compensated executive officers Dr. Tirtha Chakraborty, our Chief Scientific Officer, and Dr. Christopher Slapak, our Chief Medical Officer.

2020 Summary Compensation Table

The following table provides information regarding the compensation provided to our named executive officers for the year ended December 31, 2020.

Name and Principal Position	Year	Salary ($)	Bonus ($)	Option Awards ($)(1)	Non-Equity Incentive Plan Compensation ($)(2)	All Other Compensation ($)	Total ($)
Robert Ang, M.B.B.S.(3) President and Chief Executive Officer	2020	424,173	—	1,619,356	211,200	500,015(4)	2,754,744
Tirtha Chakraborty, Ph.D. Chief Scientific Officer	2020	298,439	47,600(5)	718,008	111,784	2,059(6)	1,177,890
Christopher Slapak, M.D. Chief Medical Officer	2020	176,846(7)	—	627,356	136,800	283,344(8)	1,224,346

(1) This column reflects the full grant date fair value of stock awards and option awards granted during the year measured pursuant to Financial Accounting Standard Board Accounting Standards Codification Topic 718 ("ASC 718"), which is the basis for computing stock-based compensation in our financial statements. This calculation assumes that the named executive officer will perform the requisite service for the award to vest in full as required by SEC rules. These amounts do not reflect the actual economic value that will be realized by the named executive officer upon vesting of the stock options, the exercise of the stock options or the sale of the common stock underlying such stock options. See Note 9 to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K ("Annual Report").

(2) The amounts disclosed represent performance bonuses earned in 2020.

(3) Dr. Ang is also a member of our board of directors but did not receive any additional compensation in his capacity as a director.

(4) Consists of $497,920 resulting from our forgiveness of a loan to Dr. Ang, an aggregate of $1,645 in life insurance and disability insurance premiums paid by us on Dr. Ang's behalf and reimbursement of $450 in commuting expenses.

(5) Dr. Chakraborty was awarded a one-time bonus in connection with his promotion to Chief Scientific Officer.

(6) Consists of an aggregate of $1,609 in life insurance and disability insurance premiums paid by us on Dr. Chakraborty's behalf and reimbursement of $450 in commuting expenses.

(7) Dr. Slapak commenced employment with us as our Chief Medical Officer in July 2020.

(8) Consists of $282,592 paid to Christopher Slapak Consulting LLC for Dr. Slapak's consulting services to us from January 2020 until his commencement of employment with us in July 2020 and an aggregate of $752 in life insurance and disability insurance premiums paid by us on Dr. Slapak's behalf.

Narrative to the Summary Compensation Table

We review compensation annually for all employees, including our executive officers. In setting executive base salaries and bonuses and granting equity incentive awards, we consider compensation for comparable positions in the market, the historical compensation levels of our executives, individual performance as compared to our expectations and objectives, our desire to motivate our employees to achieve short- and long-term results that are in the best interests of our stockholders and a long-term commitment to our company. We do not target a specific competitive position or a specific mix of compensation among base salary, bonus or long-term incentives.

Our board of directors has historically determined our executive officers' compensation and has typically reviewed and discussed management's proposed compensation with our chief executive officer for all executives other than our chief executive officer. Based on those discussions and its discretion, the board of directors then approved the compensation of each executive officer.

Annual Base Salary

We have entered into offer letters with each of our named executive officers that establish annual base salaries, which are generally determined, approved and reviewed periodically by our board of directors in order to compensate our named executive officers for the satisfactory performance of duties to our company. Annual base salaries are intended to provide a fixed component of compensation to our named executive officers, reflecting their skill sets, experience, roles and responsibilities. Base salaries for our named executive officers have generally been set at levels deemed necessary to attract and retain individuals with superior talent. See "—Offer Letters and Potential Payments Upon Termination or Change in Control."

Non-Equity Incentive Plan Compensation

In accordance with the terms of their offer letters, our named executive officers are eligible to receive discretionary annual bonuses of up to a percentage of each officer's gross base salary based on individual performance, company performance or as otherwise determined appropriate, as determined by our board of directors. In 2020, our named executive officers were eligible to earn an annual target performance bonus of each executive's 2020 base salary based on achievement of certain corporate objectives. Dr. Ang was eligible to earn 40% of his 2020 base salary and Drs. Slapak and Chakraborty were each eligible to earn 30% of their 2020 base salaries. In 2021, our board of directors adjusted Drs. Ang, Slapak and Chakraborty's target bonus percentages to 50%, 40% and 40%, respectively, of their current base salary.

Equity-Based Incentive Awards

Our equity-based incentive awards are designed to align our interests with those of our employees and consultants, including our executive officers. Our board of directors has historically been responsible for approving equity grants. Vesting of equity awards is generally tied to continuous service with us and serves as an additional retention measure. Our executives generally are awarded an initial new hire grant upon commencement of employment. We have also made true-up awards following certain financing events or promotions. Additional grants may occur periodically in order to specifically incentivize executives with respect to achieving certain corporate goals or to reward executives for exceptional performance.

The following table provides information regarding the outstanding equity awards held by our named executive officers as of December 31, 2020. All awards were granted pursuant to the 2015 Stock Incentive Plan, as amended (the "2015 Plan"). See "—Equity Incentive Plans—2015 Plan" below for additional information.

Outstanding Equity Awards at December 31, 2020

	Option Awards(1)							Stock Awards(1)	
Name	Grant Date	Vesting Commencement Date	Vesting Cliff Date	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date	Number of Shares or Units of Stock that Have Not Vested (#)	Market Value of Shares or Units of Stock that Have Not Vested ($)(2)
Robert Ang, M.B.B.S., M.B.A.	8/5/2019	8/5/2019	—	—	—	—	—	244,078 (3)	2,191,820
	3/10/2020	8/5/2019	—	18,460 (4)	128,833	$ 2.18	3/9/2030	—	—
	8/21/2020	7/1/2020	9/1/2020	67,925	584,161 (5)	$ 1.90	8/20/2030	—	—
Christopher Slapak, M.D.	8/21/2020	7/1/2020	8/1/2020	15,946	137,141 (5)	$ 1.90	8/20/2030	—	—
	8/25/2020	7/30/2019	—	54,229	98,889 (6)	$ 1.90	8/24/2030	—	—
Tirtha Chakraborty, Ph.D.	9/25/2019	9/23/2019	—	14,451	31,794 (6)	$ 1.36	9/24/2030	—	—
	3/10/2020	9/23/2019	—	7,628	16,782 (6)	$ 2.18	3/9/2030	—	—
	8/21/2020	7/1/2020	10/1/2020	7,360	63,296 (5)	$ 1.90	8/20/2030	—	—
	11/18/2020	11/16/2020	—	2,527	118,795 (6)	$ 6.53	11/17/2030	—	—

(1) All equity awards were granted under our 2015 Plan, the terms of which are described below under the subsection titled "—Equity Incentive Plans—2015 Stock Incentive Plan."

(2) This column represents the fair market value of a share of our common stock of $8.98 as of December 31, 2020 (the determination of the fair market value by our board of directors as of the most proximate date) multiplied by the amount shown in the column "Stock Awards—Number of Shares or Units of Stock That Have Not Vested."

(3) The shares were acquired pursuant to the exercise of unvested options granted to Dr. Ang on August 5, 2019 and are subject to our right of repurchase upon Dr. Ang's termination of service. The shares will be released from our repurchase right in equal monthly installments on the fifth day of each month through August 5, 2023, subject to continuous service with us as of each such date. The restricted shares are subject to vesting acceleration, as described in more detail below under the subsection titled "—Offer Letters and Potential Payments Upon Termination or Change in Control."

(4) Twenty-five percent of the shares subject to the option vest on the first anniversary of the vesting commencement date, and thereafter the remaining shares subject to the option vest in 36 equal monthly installments on each monthly anniversary thereafter, subject to continuous service with us as of each such vesting date. The option is exercisable immediately with respect to all shares subject to the option granted on such date, subject to a repurchase right in favor of us which lapses as the option vests. As a result, this reflects the number of shares subject to the option that were exercisable and vested as of December 31, 2020. The option is subject to vesting acceleration, as described in more detail below under the subsection titled "—Offer Letters and Potential Payments Upon Termination or Change in Control."

(5) The shares subject to the option vest in equal monthly installments beginning on the vesting commencement date, subject to continuous service as of the vesting cliff date set forth in the table above and further subject to continuous service as of each such vesting date.

(6) Twenty-five percent of the shares subject to the option vest on the first anniversary of the vesting commencement date, and thereafter the remaining shares subject to the option vest in 36 equal monthly installments on each monthly anniversary thereafter, subject to continuous service with us as of each such vesting date.

401(k) Plan

We maintain a defined contribution retirement plan that provides eligible U.S. employees, including our named executive officers, with an opportunity to save for retirement. 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). Eligible employees may defer eligible compensation on a pre-tax basis or make Roth post-tax contributions, up to the statutorily prescribed annual limits on contributions under the Code. We do not make matching or other contributions. Employee contributions are allocated to each participant's individual account and are then invested in selected investment alternatives according to the participant's directions. Employees are immediately and fully vested in their contributions.

Health and Welfare Benefits; Perquisites

Our named executive officers are eligible to participate in our other benefit programs on the same basis as all employees of our company. We generally do not provide perquisites or personal benefits except in limited circumstances.

Severance and Change in Control Benefits Plan

In January 2021, we adopted our Executive Severance and Change in Control Benefits Plan (the "Severance Plan"), for certain of our employees, including each of our executive officers. Under the terms of the Severance Plan, if the employment of any of our officers or vice presidents is terminated by us without cause or by the officer for good reason prior to or more than 12 months following a change in control, each as defined in the Severance Plan, and subject to the employee's execution of a general release of potential claims against us and a non-competition agreement, we have agreed to continue to pay the employee's then-current base salary for a period of 12 months, in the case of our C-level officers, and six months, in the case of our vice presidents, and to pay premiums for continuation of health coverage under COBRA for up to 12 months, in the case of our C-level officers, and up to six months, in the case of our vice presidents.

Alternatively, if a covered employee's employment is terminated by us without cause or by the employee for good reason within one year following a change in control, and subject to the employee's execution of a general release of potential claims against us and a non-competition agreement, we have agreed, in the case of our chief executive officer, to pay a lump sum payment in an amount equal to 18 months of his then-current base salary, in the case of our other C-level officers, to pay a lump sum payment in an amount equal to 12 months of his or her then-current base salary and, in the case of our vice presidents, to pay a lump sum payment in an amount equal to six months of his or her then-current base salary; to pay premiums for continuation of health coverage under COBRA for up to 18 months, in the case of our chief executive officer, up to 12 months, in the case of our other C-level officers, and up to six months, in the case of our vice presidents; to pay a lump sum payment in an amount equal to 150%, in the case of our chief executive officer, 100%, in the case of our C-level officers, and 50%, in the case of our vice presidents, of the employee's target annual bonus as then in effect; and to accelerate the vesting of any outstanding equity grants in full.

In addition, in the event any of the amounts provided for under the Severance Plan or otherwise would constitute a "parachute payment" within the meaning of Section 280G of the Internal Revenue Code of 1986, as amended (the "Code") and such payments would be subject to the excise tax imposed by Section 4999 of the Code, then such payments will either be (i) provided to the employee in full, or (ii) reduced to such lesser amount that would result in a smaller or no portion of such payments being subject to the excise tax, whichever amount, after taking into account all applicable taxes, including the excise tax, would result in the employee's receipt, on an after-tax basis, of the greatest amount of such payments.

Offer Letters and Potential Payments Upon Termination or Change in Control

We are party to offer letters with each of our named executive officers. The agreements generally provide for at-will employment without any specific term and set forth the named executive officer's initial base salary, eligibility for employee benefits and severance benefits upon a qualifying termination of employment or change in control of our company. Each of our named executive officers has executed our standard confidentiality, intellectual property assignment and non-solicitation agreement. The key terms of the offer letters with our named executive officers, including potential payments upon termination or change in control, are described below.

Dr. Robert Ang

We entered into an offer letter with Robert Ang in June 2019 in connection with his appointment as our President and Chief Executive Officer. The offer letter provides for a base salary of $395,000 per year, a one-time signing bonus of $76,000 and a target annual bonus equal to 40% of Dr. Ang's annual base salary based on the achievement of goals established by our board of directors. In February 2020 and September 2020, our board of directors approved increases in Dr. Ang's annual base salary to $408,825 and $440,000, respectively. Additionally, in January 2021, our Board of directors approved an increase in Dr. Ang's annual base salary for 2021 and subsequent years to $514,600 and an increase of his target annual bonus to 50% of his annual salary. The offer letter further provides for the grant of an initial option to purchase 366,117 shares of our common stock, which was granted on August 5, 2019 at an exercise price of $1.36 per share, and a grant of an option to purchase 193,249 shares of our common stock following the milestone closing of our Series A-2 preferred stock financing, which was granted on March 10, 2020 at an exercise price of $2.18 per share. Each option shall vest with respect to 25% of the shares subject to the option on the first anniversary of the applicable grant date, and the remaining 75% of such shares subject to the option shall vest in 36 monthly installments thereafter, subject to Dr. Ang's continued service through each applicable vesting date. Further, each option provides for the early exercise of such option, subject to the terms of the 2015 Plan and option agreements thereunder.

In addition to benefits pursuant to the Severance Plan, as described above, Dr. Ang is also entitled to severance benefits pursuant to his offer letter. Pursuant to his offer letter, if we terminate Dr. Ang's employment without cause, or if Dr. Ang terminates his employment for good reason or due to death or disability, each as defined in Dr. Ang's offer letter, he will be entitled to (i) cash severance equal to continued base salary payments commencing on Dr. Ang's termination date until the first anniversary of such termination date (the "Ang Severance Period"), paid in equal monthly installments in accordance with our standard payroll policies and (ii) if he timely elects to continue health coverage through COBRA, direct payment of, or reimbursement for, COBRA premiums for Dr. Ang and his covered dependents for the Ang Severance Period or, if earlier, until Dr. Ang is eligible for healthcare coverage under another employer's plan. These severance benefits are conditioned upon Dr. Ang's resignation from all positions with us, execution of a release agreement, return of company property and compliance with his confidentiality, intellectual property assignment and non-solicitation agreement.

Notwithstanding the foregoing, in the event we undergo a change in control, as defined in Dr. Ang's offer letter, Dr. Ang's then-outstanding equity awards granted pursuant to the offer letter will vest in full, subject to Dr. Ang's continued service through the date of such change in control.

Dr. Tirtha Chakraborty

We entered into an offer letter with Tirtha Chakraborty in August 2019 in connection with his hiring as our Vice President of Research. The offer letter provides for a base salary of $285,000 per year and a target annual bonus equal to 30% of Dr. Chakraborty's annual base salary based on the achievement of goals established by our board of directors. Dr. Chakraborty's annual base salary was increased to $325,000 in connection with his appointment as our Chief Scientific Officer in November 2020. Additionally, in January 2021, our Board of directors approved an increase in Dr. Chakraborty's annual base salary for 2021 and subsequent years to $390,200 and an increase of his target annual bonus to 40% of his annual salary. In addition, under the offer letter Dr. Chakraborty received a one-time signing bonus equal to $30,000, with an additional payment to cover all taxes

resulting from the payment of the signing bonus. The offer letter further provides for the grant of an initial option to purchase 46,246 shares of our common stock, which was granted on September 25, 2019 at an exercise price of $1.36 per share, and a grant of an option to purchase 24,410 shares of our common stock following the milestone closing of our Series A-2 preferred stock financing, which was granted on March 10, 2020 at an exercise price of $2.18 per share. Each option shall vest with respect to 25% of the shares subject to the option on the first anniversary of the applicable grant date, and the remaining 75% of such shares subject to the option shall vest in 36 monthly installments thereafter, subject to Dr. Chakraborty's continued service through each applicable vesting date.

Dr. Christopher Slapak

We entered into an offer letter with Christopher Slapak in July 2020 in connection with his hiring as our full-time Chief Medical Officer. The offer letter provides for a base salary of $380,000 per year and a target annual bonus equal to 30% of Dr. Slapak's annual base salary based on the achievement of goals established by our board of directors. Additionally, in January 2021, our Board of directors approved an increase in Dr. Slapak's annual base salary for 2021 and subsequent years to $432,600 and an increase of his target annual bonus to 40% of his annual salary. The offer letter further provides for the grant of an initial option to purchase 153,119 shares of our common stock, which was granted on August 25, 2020 at an exercise price of $1.91 per share. The option shall vest with respect to 25% of the shares subject to the option on the first anniversary of the applicable grant date, and the remaining 75% of such shares subject to the option shall vest in 36 monthly installments thereafter, subject to Dr. Slapak's continued service through each vesting date.

In addition to benefits pursuant to the Severance Plan, as described above, Dr. Slapak is also entitled to severance benefits pursuant to his offer letter. Pursuant to his offer letter, if we terminate Dr. Slapak's employment without cause, or if Dr. Slapak terminates his employment for good reason, each as defined in Dr. Slapak's offer letter, he will be entitled to (i) cash severance equal to continued base salary payments commencing on Dr. Slapak's termination date until the first anniversary of such termination date (the "Slapak Severance Period"), paid in equal monthly installments in accordance with our standard payroll policies and (ii) if he timely elects to continue health coverage through COBRA, direct payment of, or reimbursement for, COBRA premiums for Dr. Slapak and his covered dependents for the Slapak Severance Period or, if earlier, until Dr. Slapak is eligible for healthcare coverage under another employer's plan. These severance benefits are conditioned upon Dr. Slapak's resignation from all positions with us, execution of a release agreement, return of all company property and compliance with his confidentiality, intellectual property assignment and non-solicitation agreement.

Dr. Slapak provided consulting services to us prior to the commencement of his full-time employment as our Chief Medical Officer and received consulting fees of $500 per hour. See "Certain Relationships and Related Transactions, and Director Independence—Consulting Agreement with Christopher Slapak Consulting LLC."

Equity Incentive Plans

2021 Equity Incentive Plan

Our board of directors adopted and our stockholders approved our 2021 Equity Incentive Plan (the "2021 Plan") in February 2021. The 2021 Plan became effective on February 5, 2021, from which point no further grants were or will be made under our 2015 Plan, as described in "—Equity Incentive Plans—2015 Stock Incentive Plan." Our 2021 Plan will provide for the grant of stock options qualifying as incentive stock options ("ISOs") within the meaning of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"), to our employees and for the grant of nonstatutory stock options ("NSOs"), restricted stock awards, restricted stock unit awards, stock appreciation rights, performance stock awards and other forms of stock compensation to our employees, consultants and directors. As of March 12, 2021, there were options to purchase 375,934 shares of our common stock outstanding under the 2021 plan, at a weighted average exercise price of $21.80 per share, and no options to purchase shares of our common stock have been exercised. Our employees, officers, directors, consultants, and advisors are eligible to receive awards under the 2021 Plan; however, incentive stock options may only be granted to our employees. We granted under the 2021 Plan options to purchase an aggregate of 323,011 shares to certain of our employees and our non-employee directors in connection with our initial public offering ("IPO").

Authorized Shares. The number of shares of our common stock initially reserved for issuance under our 2021 Plan is the sum of (i) 3,088,235 and (ii) the number of shares of our common stock subject to outstanding awards under our 2015 Plan that expire or are forfeited, canceled, withheld to satisfy tax withholding or to purchase or exercise an award, repurchased by us or are otherwise terminated. The number of shares of our common stock reserved for issuance under our 2021 Plan will automatically increase on January 1 of each year, for a period of ten years, from January 1, 2022 continuing through January 1, 2031, by 4% of the total number of shares of our common stock outstanding on December 31 of the preceding calendar year, or a lesser number of shares as may be determined by our board of directors. The maximum number of shares that may be issued pursuant to the exercise of ISOs under the 2021 Plan is 23,742,528.

Administration. Our board of directors, or a duly authorized committee thereof (referred to herein as the "administrator"), has the authority to administer our 2021 Plan. Our board of directors has delegated its authority to administer our 2021 Plan to our compensation committee under the terms of the compensation committee's charter. Our board of directors may also delegate to one or more of our officers the authority to (i) designate employees other than officers to receive specified stock awards and (ii) determine the number of shares of our common stock to be subject to such stock awards. Subject to the terms of our 2021 Plan, the administrator has the authority to determine the terms of awards, including recipients, the exercise price or strike price of stock awards, if any, the number of shares subject to each stock award, the fair market value of a share of our common stock, the vesting schedule applicable to the awards, together with any vesting acceleration, the form of consideration, if any, payable upon exercise or settlement of the stock award and the terms and conditions of the award agreements for use under our 2021 Plan.

The administrator has the power to modify outstanding awards under our 2021 Plan. Subject to the terms of our 2021 Plan, the administrator has the authority to reprice any outstanding option or stock award, cancel and re-grant any outstanding option or stock award in exchange for new stock awards, cash or other consideration, or take any other action that is treated as a repricing under generally accepted accounting principles, with the consent of any adversely affected participant.

Corporate Transactions. The following applies to stock awards under the 2021 Plan in the event of certain specified corporate transactions, unless otherwise provided in a participant's stock award agreement or other written agreement with us or one of our affiliates or unless otherwise expressly provided by the plan administrator at the time of grant.

In the event of a corporate transaction, any stock awards outstanding under the 2021 Plan may be assumed, continued or substituted for by any surviving or acquiring corporation (or its parent company), and any reacquisition or repurchase rights held by us with respect to the stock award may be assigned to our successor (or its parent company). If the surviving or acquiring corporation (or its parent company) does not assume, continue or substitute for such stock awards, then (i) with respect to any such stock awards that are held by participants whose continuous service has not terminated prior to the effective time of the corporate transaction, or current participants, the vesting (and exercisability, if applicable) of such stock awards will be accelerated in full (or, in the case of performance awards with multiple vesting levels depending on the level of performance, vesting will accelerate at 100% of the target level) to a date prior to the effective time of the corporate transaction (contingent upon the effectiveness of the corporate transaction), and such stock awards will terminate if not exercised (if applicable) at or prior to the effective time of the corporate transaction, and any reacquisition or repurchase rights held by us with respect to such stock awards will lapse (contingent upon the effectiveness of the corporate transaction), and (ii) any such stock awards that are held by persons other than current participants will terminate if not exercised (if applicable) prior to the effective time of the corporate transaction, except that any reacquisition or repurchase rights held by us with respect to such stock awards will not terminate and may continue to be exercised notwithstanding the corporate transaction.

In the event a stock award will terminate if not exercised prior to the effective time of a corporate transaction, the plan administrator may provide, in its sole discretion, that the holder of such stock award may not exercise such stock award but instead will receive a payment equal in value to the excess (if any) of (i) the per share amount payable to holders of our common stock in connection with the corporate transaction, over (ii) any per share exercise price payable by such holder, if applicable. In addition, any escrow, holdback, earn out or similar

provisions in the definitive agreement for the corporate transaction may apply to such payment to the same extent and in the same manner as such provisions apply to the holders of our common stock.

Under the 2021 Plan, a significant corporate transaction is generally the consummation of (i) a sale or other disposition of all or substantially all of our consolidated assets; (ii) a sale or other disposition of at least 50% of our outstanding securities; (iii) a merger, consolidation or similar transaction following which we are not the surviving corporation; or (iv) a merger, consolidation or similar transaction following which we are the surviving corporation but the shares of our common stock outstanding immediately prior to such transaction are converted or exchanged into other property by virtue of the transaction.

Amendment or Termination. Our board has the authority to amend, suspend, or terminate our 2021 Plan, provided that such action does not materially impair the existing rights of any participant without such participant's written consent. No ISOs may be granted after the tenth anniversary of the date our board of directors adopts our 2021 Plan.

2015 Stock Incentive Plan

The 2015 Plan was adopted by our board of directors and approved by our stockholders in December 2015. The 2015 Plan provides for the grant of ISOs, NSOs, restricted stock awards, restricted stock units, stock appreciation rights and other stock-based awards. Our employees, officers, directors, consultants and advisors are eligible to receive awards under the 2015 Plan; however, ISOs may only be granted to our employees. As of March 12, 2021, there were 4,394,497 shares of common stock issuable upon the exercise of stock options outstanding under the 2015 Plan at a weighted-average exercise price of $2.32 per share, and options to purchase 804,641 shares of our common stock had been exercised, including 358,251 restricted shares of common stock that were issued related to early exercise of unvested options. As of February 5, 2021, we will grant no further stock options or other awards under the 2015 Plan. However, any shares of common stock subject to awards under our 2015 Plan that expire, terminate, or otherwise are surrendered or canceled without being fully exercised, are forfeited (including as the result of shares of common stock subject to such award being repurchased by us at the original issuance price pursuant to a contractual repurchase right) or results in any common stock not being issued will become available for issuance under our 2021 Plan. Further, shares of common stock tendered to us by a participant to exercise an award shall be added to shares of common stock available for the grant of awards under the 2015 Plan.

Administration. Our board of directors, or a committee appointed by our board, administers the 2015 Plan and, subject to any limitations set forth in the 2015 Plan, will select the recipients of awards, determine the number of shares of common stock to be subject to such stock awards and specify the other terms and conditions, including the exercise price or purchase price and vesting schedule, applicable to such stock awards. Our board of directors has delegated its authority to administer our 2021 Plan to our compensation committee under the terms of the compensation committee's charter Our board of directors has delegated its authority to administer our 2021 Plan to our compensation committee under the terms of the compensation committee's charter.

If a stock award granted under the 2015 Plan expires, terminates or otherwise is surrendered or canceled without being exercised in full, is forfeited in whole or in part (including as the result of shares of common stock subject to such award being repurchased by us at the original issuance price pursuant to a contractual repurchase right), or results in any common stock not being issued, the shares of our common stock not acquired pursuant to the stock award again will become available for subsequent issuance under the 2021 Plan. Further, shares of common stock tendered to us by a participant to exercise an award shall be added to shares of common stock available for the grant of awards under the 2021 Plan.

Changes to Capital Structure. Upon the occurrence of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spinoff, 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, under

the terms of the 2015 Plan, we are required to equitably adjust (or make substitute awards, if applicable), in the manner determined by our board of directors or compensation committee:

- the number and class of securities available under the 2015 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 subject to and the repurchase price per share subject to each outstanding restricted stock award; and
- the share and per-share-related provisions and the purchase price, if any, of each outstanding other stock-based award.

Reorganization Events. Upon the occurrence of a merger or consolidation of our company with or into another entity as a result of which all of our common stock is converted into or exchanged for the right to receive cash, securities, or other property or is cancelled; any transfer or disposition of all of our common stock for cash, securities, or other property pursuant to a share exchange or other transaction; or a liquidation or dissolution of our company, our board of directors may, on such terms as our board of directors determines, take any one or more of the following actions pursuant to the 2015 Plan, as to some or all outstanding awards, other than restricted stock awards:

- provide that awards shall be assumed, or substantially equivalent awards shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof);
- upon written notice to a plan participant, provide that the participant's unexercised awards will terminate immediately prior to the consummation of such transaction unless exercised by the participant (to the extent then exercisable) within a specified period;
- provide that outstanding awards shall become exercisable, realizable or deliverable, or restrictions applicable to an award shall lapse, in whole or in part, prior to or upon such transaction;
- in the event of a transaction under the terms of which holders of common stock will receive upon consummation thereof a cash payment for each share surrendered in the transaction, make or provide for a cash payment to a plan participant;
- provide that, in connection with a liquidation of dissolution of the company, awards shall convert into the right to receive liquidation proceeds; or
- any combination of the foregoing.

Our board of directors is not obligated under the 2015 Plan to treat all awards, all awards held by a participant, or all awards of the same type, identically.

Upon the occurrence of any corporate transaction described above, other than our liquidation or dissolution, our repurchase and other rights under each outstanding restricted stock award will continue for the benefit of our successor and will, unless our board of directors or compensation committee determines otherwise, apply to the cash, securities, or other property which our common stock was converted into or exchanged for in the transaction in the same manner and to the same extent as they applied to the common stock subject to the restricted stock award; provided, however, that our board of directors or the compensation committee may provide termination or deemed satisfaction of such repurchase or other rights under the restricted stock award agreement, either initially or by amendment, or provide for forfeiture of such restricted stock if issued at no cost. Upon our liquidation or dissolution, except to the extent specifically provided to the contrary in the restricted stock award agreement or any other agreement between the plan participant and us, all restrictions and conditions on all restricted stock awards then outstanding will automatically be deemed terminated or satisfied. Our board of directors or our compensation committee, in their sole discretion, may accelerate the exercisability of any option or time at which any restrictions shall lapse or be removed from any restricted stock award, as the case may be.

Amendment and Termination. Our board of directors and the compensation committee has the authority to amend, suspend or terminate the 2015 Plan, provided that, if approval of our stockholders is required, our board of directors and compensation committee may not effect such modification or amendment without such approval. Unless otherwise specified, any amendment to the 2015 Plan shall apply to all outstanding awards, and be binding on holders of such awards, at the time the amendment is adopted, provided that our board of directors determines such amendment does not materially and adversely affect the rights of the holders. Unless terminated sooner by our board of directors or compensation committee, the 2015 Plan will automatically terminate on December 30, 2025. No stock awards may be granted under the 2015 Plan while it is suspended or terminated.

2021 Employee Stock Purchase Plan

Our board of directors adopted and our stockholders approved our 2021 Employee Stock Purchase Plan (the "ESPP") in February 2021. The ESPP became effective on February 5, 2021. The purpose of the ESPP is to secure the services of new employees, to retain the services of existing employees and to provide incentives for such individuals to exert maximum efforts toward our success. The ESPP includes two components. One component is designed to allow eligible U.S. employees to purchase common stock in a manner that may qualify for favorable tax treatment under Section 423 of the Code. In addition, purchase rights may be granted under a component that does not qualify for such favorable tax treatment when necessary or appropriate to permit participation by eligible employees who are foreign nationals or employed outside of the United States while complying with applicable foreign laws. The ESPP is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the Code.

Share Reserve. The ESPP authorizes the issuance of shares of our common stock pursuant to purchase rights granted to our employees or to employees of any of our designated affiliates. The ESPP provides participating employees with the opportunity to purchase up to an aggregate of 372,000 shares of our common stock. The number of shares of our common stock reserved for issuance will automatically increase on January 1 of each calendar year, from January 1, 2022 through January 1, 2031, by the lesser of (i) 1% of the total number of shares of our common stock outstanding on December 31 of the preceding calendar year, and (ii) 1,800,000 shares; provided, that prior to the date of any such increase, our board of directors may determine that such increase will be less than the amount set forth in clauses (i) and (ii). If purchase rights granted under the ESPP terminate without having been exercised, the shares of our common stock not purchased under such purchase rights will again become available for issuance under the ESPP.

Administration. Our board of directors has delegated concurrent authority to administer the ESPP to our compensation committee. The ESPP is implemented through a series of offerings under which eligible employees are granted purchase rights to purchase shares of our common stock on specified dates during such offerings. Under the ESPP, we may specify offerings with durations of not more than 27 months, and may specify shorter purchase periods within each offering. Each offering will have one or more purchase dates on which shares of our common stock will be purchased for employees participating in the offering. An offering under the ESPP may be terminated under certain circumstances.

Corporate Transactions. In the event of certain significant corporate transactions, including (i) a sale of all or substantially all of our assets, (ii) the sale or disposition of more than 50% of our outstanding securities, (iii) the consummation of a merger or consolidation where we do not survive the transactions and (iv) the consummation of a merger or consolidation where we do survive the transaction but the shares of our common stock outstanding immediately prior to such transaction are converted or exchanged into other property by virtue of the transaction, any then-outstanding rights to purchase our stock under the ESPP may be assumed, continued or substituted for by any surviving or acquiring entity (or its parent company). If the surviving or acquiring entity (or its parent company) elects not to assume, continue or substitute for such purchase rights, then the participants' accumulated payroll contributions will be used to purchase shares of our common stock within ten business days prior to such corporate transaction, and such purchase rights will terminate immediately.

Amendments or Termination. Our board of directors and compensation committee has the authority to amend or terminate our ESPP, provided that except in certain circumstances such amendment or termination may not materially impair any outstanding purchase rights without the holder's consent.

As of March 12, 2021, we have not made any offerings under our the ESPP.

Limitations on Liability and Indemnification Matters

Our amended and restated certificate of incorporation contains provisions that limit the liability of our current and former directors for monetary damages to the fullest extent permitted by Delaware law. Delaware law provides that directors of a corporation will not be personally liable for monetary damages for any breach of fiduciary duties as directors, except liability for:

- any breach of the director's duty of loyalty to the corporation or its stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the Delaware General Corporation Law; or
- any transaction from which the director derived an improper personal benefit.

These limitations of liability do not apply to liabilities arising under federal securities laws and does not affect the availability of equitable remedies such as injunctive relief or rescission.

Our amended and restated certificate of incorporation and our amended and restated bylaws provide that we are required to indemnify our directors to the fullest extent permitted by Delaware law. Our amended and restated bylaws will also provide that, upon satisfaction of certain conditions, we are required to advance expenses incurred by a director in advance of the final disposition of any action or proceeding, and permit us to secure insurance on behalf of any officer, director, employee or other agent for any liability arising out of his or her actions in that capacity regardless of whether we would otherwise be permitted to indemnify him or her under the provisions of Delaware law. Our amended and restated bylaws also provide our board of directors with discretion to indemnify our officers and employees when determined appropriate by the board.

We have entered into indemnification agreements with each of our directors and executive officers. With certain exceptions, these agreements provide for indemnification for related expenses including, among other things, attorneys' fees, judgments, fines and settlement amounts incurred by any of these individuals in any action or proceeding. We believe that these bylaw provisions and indemnification agreements are necessary to attract and retain qualified persons as directors and executive officers. We also maintain customary directors' and officers' liability insurance.

The limitation of liability and indemnification provisions in our amended and restated certificate of incorporation and amended and restated bylaws may discourage stockholders from bringing a lawsuit against our directors for breach of their fiduciary duty. They may also reduce the likelihood of derivative litigation against our directors and officers, even though an action, if successful, might benefit us and other stockholders. Further, a stockholder's investment may be adversely affected to the extent that we pay the costs of settlement and damage awards against directors and officers as required by these indemnification provisions. At present, there is no pending litigation or proceeding involving any of our directors, officers or employees for which indemnification is sought and we are not aware of any threatened litigation that may result in claims for indemnification.

Insofar as indemnification for liabilities arising under the Securities Act of 1933, as amended (the "Securities Act"), may be permitted for our directors, executive officers or persons controlling us, we have been informed that, 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 them. The director or officer may amend a Rule 10b5-1 plan in some circumstances and may terminate a plan at any time. Our directors and executive officers also may buy or sell additional shares outside of a Rule 10b5-1 plan when they are not in possession of material nonpublic information subject to compliance with the terms of our insider trading policy.

Non-Employee Director Compensation

From our inception to our IPO, we did not have a formal compensation policy with respect to service on our board of directors. However, we have provided varying amounts of cash compensation and equity-based compensation to our independent directors who are not employees or affiliated with our largest investors for the time and effort necessary to serve as a member of our board of directors. In addition, our non-employee directors are entitled to reimbursement of direct expenses incurred in connection with attending meetings of our board of directors or committees thereof.

Our board of directors adopted a non-employee director compensation policy in January 2021 that became effective on February 5, 2021 and is applicable to all of our non-employee directors. This compensation policy provides that each such non-employee director will receive the following compensation for service on our board of directors:

- an annual cash retainer of $35,000;
- an additional annual cash retainer for service as Chair of board of directors in an amount to be determined by the Board each year and which has been set at $30,000 for 2021;
- an additional annual cash retainer of $7,500, $5,000 and $4,000 for service as a member of the audit committee, compensation committee and the nominating and corporate governance committee, respectively;
- an additional annual cash retainer of $15,000, $10,000 and $8,000 for service as chair of the audit committee, compensation committee and the nominating and corporate governance committee, respectively;
- an initial option grant to purchase 33,823 shares of our common stock on the date of each such non-employee director's appointment to our board of directors, with the shares vesting in 36 equal monthly installments, subject to continued service as a director through the vesting date; and
- an annual option grant to purchase 16,911 shares of our common stock on the date of each of our annual stockholder meetings, beginning with our 2022 annual stockholder meeting, with the shares vesting on the earlier of the first anniversary of the date of grant or the next annual stockholders meeting, subject to continued service as a director though the applicable vesting date.

We also will continue to reimburse our non-employee directors for reasonable travel and other expenses incurred in connection with attending our board of director and committee meetings. We do not pay any compensation to our President and Chief Executive Officer in connection with his service on our board of directors. The compensation that we pay to our President and Chief Executive Officer is discussed earlier in this "Executive Compensation" section.

Each of the option grants described above will be granted under our 2021 Plan, the terms of which are described in more detail above under the section titled "Executive Compensation—Employee Benefit Plans—2021 Equity Incentive Plan." Each option awarded to directors under the non-employee director compensation policy will

be subject to accelerated vesting upon a "change in control" (as defined in the 2021 Plan). The term of each option will be ten years, subject to earlier termination as provided in the 2021 Plan.

Our board of directors approved a grant to each of our non-employee directors of an option to purchase 16,900 shares of our common stock effective on February 5, 2021 with an exercise price per share equal $18.00 per share, with the shares vesting in 36 equal monthly installments, subject to continued service through the vesting date.

2020 Director Compensation Table

The following table sets forth information regarding the compensation earned for service on our board of directors in 2020 by our non-employee directors, including the outstanding equity awards held by our non-employee directors as of December 31, 2020. Robert Ang, our President and Chief Executive Officer, is also a member of our board of directors but did not receive any additional compensation for service as a director.

Name	Fees Earned or Paid in Cash ($)	Option Awards ($)(1)(2)	Total ($)
Kush Parmar, M.D., Ph.D.	—	—	—
Daniella Beckman	14,429	85,352	99,781
Bharatt Chowrira, Ph.D.(3)	—	—	—
David C. Lubner	12,636	85,392	98,028
Sven (Bill) Ante Lundberg, M.D.	30,000	43,407	73,407
Matthew Patterson	7,011	134,244	141,255
Joshua Resnick, M.D.	—	—	—

(1) This column reflects the full grant date fair value of options granted during the year measured pursuant to ASC 718, which is the basis for computing stock-based compensation in our financial statements. See Note 9 to our consolidated financial statements appearing elsewhere in this Annual Report for information concerning certain of the specific assumptions we used in valuing options.

(2) The table below shows the aggregate number equity awards outstanding for each of our directors who is not a named executive officer, as of December 31, 2020.

Name	Number of Outstanding Options	Number of Outstanding Unvested Stock Awards
Kush Parmar, M.D., Ph.D.	—	—
Daniella Beckman	41,196	—
David C. Lubner	41,196	—
Sven (Bill) Ante Lundberg, M.D.	20,962	16,555
Matthew Patterson	—	41,196
Joshua Resnick, M.D.	—	—

(3) Dr. Chowrira resigned from our board of directors on June 30, 2020 and did not hold any option awards or unvested stock awards as of December 31, 2020.

Compensation Committee Interlocks and Insider Participation

None of our directors who serve as a member of our compensation committee is, or has at any time during the past year been, one of our officers or employees. None of our executive officers currently serves, or in the past year has served, as a member of the board of directors or compensation committee of any other entity that has one or more executive officers serving on our board of directors or compensation committee.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The following table sets forth information with respect to the beneficial ownership of our common stock, as of March 12, 2021 by:

- Each person known by us to beneficially own more than 5% of our common stock;
- each of our directors;
- each of our named executive officers; and
- All of our executive officers and directors as a group.

The column entitled "Percentage of Shares Beneficially Owned" is based on a total of 37,127,865 shares of our common stock outstanding as of March 12, 2021.

The number of shares beneficially owned by each stockholder is determined under rules issued by the Securities and Exchange Commission (the "SEC") and includes voting or investment power with respect to securities. Under these rules, beneficial ownership includes any shares as to which the individual or entity has sole or shared voting power or investment power. In computing the number of shares beneficially owned by an individual or entity and the percentage ownership of that person, shares of common stock subject to options, warrants, or other rights held by such person that are currently exercisable or will become exercisable within 60 days after March 12, 2021 are considered outstanding, although these shares are not considered outstanding for purposes of computing the percentage ownership of any other person. Unless otherwise indicated, the address of all listed stockholders is 100 Cambridgepark Dr., Suite 400, Cambridge, Massachusetts 02140. Each of the stockholders listed has sole voting and investment power with respect to the shares beneficially owned by the stockholder unless noted otherwise, subject to community property laws where applicable.

Except as indicated by the footnotes below, we believe, based on information furnished to us, that each of the stockholders listed has sole voting and investment power with respect to the shares beneficially owned by the stockholder unless noted otherwise, subject to community property laws where applicable.

Name of Beneficial Owner	Bene Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned
Greater than 5% stockholders		
Entities affiliated with RA Capital Healthcare Fund, L.P.(1)	11,120,973	30.0%
Entities affiliated with 5AM Ventures VI, L.P.(2)	6,692,429	18.0%
Entities affiliated with FMR, LLC(3)	3,935,238	10.6%
PureTech Health LLC(4)	3,207,200	8.6%
Named Executive Officer and Directors		
Robert Ang, M.B.B.S.(5)	635,660	1.7%
Tirtha Chakraborty, Ph.D.(6)	58,858	*
Christopher Slapak, M.D.(7)	95,693	*
Kush Parmar, M.D., Ph.D.(8)	6,693,837	18.0%
Daniella Beckman(9)	9,131	*
David C. Lubner(10)	9,131	*
Sven (Bill) Ante Lundberg, M.D.(11)	34,770	*
Matthew Patterson(12)	42,604	*
Joshua Resnick, M.D. (13)	1,408	*
All current executive officers and directors as a group (11 persons)(14)	7,694,657	20.5%

* Represents beneficial ownership of less than one 1%.

(1) Consists of (i) 8,297,265 shares of common stock held by RA Capital Healthcare Fund, L.P. (“RA Healthcare”); (ii) 1,825,326 shares of common stock by RA Capital Nexus Fund, L.P. (“Nexus Fund”); and (iii) 998,382 shares of common stock held in a separate account (“Account”). RA Capital Healthcare Fund GP, LLC is the general partner of RA Healthcare and RA Capital Nexus Fund GP, LLC is the general partner of the Nexus Fund. The general partner of RA Capital Management, L.P. (“RA Capital”) is RA Capital Management GP, LLC, of which Dr. Peter Kolchinsky and Mr. Rajeev Shah are the controlling persons. RA Capital serves as investment adviser for the RA Healthcare, the Account, and the Nexus Fund and may be deemed a beneficial owner, for purposes of Section 13(d) of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), of any securities of the company held by the RA Healthcare, the Account, or the Nexus Fund. RA Healthcare and the Nexus Fund have delegated to RA Capital the sole power to vote and the sole power to dispose of all securities held in the Fund’s and the Nexus Fund’s portfolio, including the shares of company’s common stock. Because RA Healthcare and the Nexus Fund have divested themselves of voting and investment power over the reported securities they hold and may not revoke that delegation on less than 61 days’ notice, RA Healthcare and the Nexus Fund disclaim beneficial ownership of the securities they hold for purposes of Section 13(d) of the Exchange Act and therefore disclaim any obligation to report ownership of the reported securities under Section 13(d) of the Exchange Act. As managers of RA Capital, Dr. Kolchinsky and Mr. Shah may be deemed beneficial owners for purposes of Section 13(d) of the Exchange Act. RA Capital, Dr. Kolchinsky, and Mr. Shah disclaim beneficial ownership of the securities other than for the purpose of determining their obligations under Section 13(d) of the Exchange Act. The address of the entities listed above is 200 Berkeley Street, 18th Floor, Boston, Massachusetts 02116. For information regarding RA Capital Management, L.P. and its affiliates, we have relied on a Schedule 13D filed by RA Capital Management, L.P. with the SEC on February 9, 2021.

(2) Consists of (i) 4,833,959 shares of common stock held by 5AM Ventures VI, L.P.; and (ii) 1,858,470 shares of common stock held by 5AM Opportunities I, L.P. (collectively, the “5AM Holdings”) 5AM Partners VI, LLC is the general partner of 5AM Ventures VI, L.P. and may be deemed to have sole investment and voting power over the shares held by 5AM Ventures VI, L.P. Andrew Schwab and Kush Parmar are the managing members of 5AM Partners VI, LLC, and may be deemed to share voting and dispositive power over the shares held by 5AM Ventures VI, L.P. 5AM Opportunities I (GP), LLC is the general partner of 5AM Opportunities I, L.P. and may be deemed to have sole investment and voting power over the shares held by 5AM Opportunities I, L.P. Andrew Schwab and Kush Parmar are the managing members of 5AM Opportunities I (GP), LLC, and may be deemed to share voting and dispositive power over the shares held by 5AM Opportunities I, L.P. Dr. Parmar is also a member of our board of directors. The address of the above persons and entities is 501 2nd Street, Suite 350, San Francisco, California 94107. For information regarding 5AM Ventures VI, L.P. and its affiliates, we have relied on a Schedule 13D filed by 5AM Ventures VI, L.P. with the SEC on February 9, 2021.

(3) FMR LLC reports sole voting power with respect to 764,153 shares and sole dispositive power with respect to 3,935,238 shares. Abigail P. Johnson is a director, the chair, the chief executive officer and the president of FMR LLC. Members of the Johnson family, including Abigail P. Johnson, are the predominant owners, directly or through trusts, of Series B voting common shares of FMR LLC, representing 49% of the voting power of FMR LLC. The Johnson family group and all other Series B shareholders of FMR LLC have entered into a shareholders’ voting agreement under which all Series B voting common shares will be voted in accordance with the majority vote of Series B voting common shares. Accordingly, through their ownership of voting common shares and the execution of the shareholders’ voting agreement, members of the Johnson family may be deemed, under the Investment Company Act of 1940, to form a controlling group with respect to FMR LLC. Neither FMR LLC nor Abigail P. Johnson has the sole power to vote or direct the voting of the shares owned directly by the various investment companies registered under the Investment Company Act of 1940 (the “Fidelity Funds”) advised by Fidelity Management & Research Company, a wholly owned subsidiary of FMR LLC, which power resides with the Fidelity Funds’ Boards of Trustees. Fidelity Management & Research Company carries out the voting of the shares under written guidelines established by the Fidelity Funds’ Boards of Trustees. The business address for each person and entity named in this footnote is 245 Summer Street, Boston, Massachusetts 02110. For information regarding FMR LLC, we have relied on a Schedule 13G filed by FMR LLC with the SEC on March 10, 2021.

(4) Voting and investment power over the shares held by PureTech Health LLC is exercised by its parent entity, PureTech Health plc. The board of directors of PureTech Health plc consists of Mr. Joichi Ito, Dr. Raju Kucherlapati, Dr. John LaMattina, Dr. Robert Langer, Dame Marjorie Scardino, Dr. Bennett Shapiro, Mr. Christopher Viehbacher, Ms. Daphne Zohar and Mr. Stephen Muniz. None of the members of the board of

directors of PureTech Health plc or PureTech Health LLC has individual voting or investment power with respect to such shares. The address for PureTech Health LLC and the individuals listed above is c/o PureTech Health LLC, 6 Tide Street, Boston, Massachusetts 02210.

(5) Consists of (i) 412,072 shares of common stock; and (ii) 223,588 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(6) Consists of (i) 3,534 shares of common stock; and (ii) 55,324 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(7) Consists of 95,693 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(8) Consists of (i) the 5AM Holdings and (ii) 1,408 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(9) Consists of 9,131 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(10) Consists of 9,131 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(11) Consists of (i) 29,432 shares of common stock and (ii) 5,338 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(12) Consists of (i) 41,196 shares of common stock and (ii) 1,408 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

(13) Consists of 1,408 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021. Under Dr. Resnick's arrangement with RA Capital, Dr. Resnick holds the foregoing shares for the benefit of the RA Healthcare, Nexus Fund and the Account. Dr. Resnick is obligated to turn over to RA Capital any net cash or stock received from the foregoing shares underlying such option, which will offset advisory fees owed by the RA Healthcare, the Nexus Fund and the Account to RA Capital. Dr. Resnick therefore disclaims beneficial ownership of the foregoing shares of common stock underlying the outstanding options held by him.

(14) Consists of (i) 5AM Holdings, (ii) 515,503 shares of common stock and (iii) 486,725 shares of common stock issuable upon the exercise of outstanding options exercisable within 60 days of March 12, 2021.

Securities authorized for issuance under equity compensation plans

The following table contains information about our equity compensation plans as of December 31, 2020. As of December 31, 2020, we had one equity compensation plan, our 2015 Plan, which was approved by our stockholders. See "Item 11. Executive Compensation—2015 Stock Incentive Plan" for a description of the material terms of the 2015 Plan. In addition, we granted an option to purchase shares of our common stock to an advisor outside of any equity compensation plan approved by our stockholders, but subject to the terms and conditions of the 2015 Plan. The stock option award to purchase 294,117 shares of our common stock had an exercise price of $28.29 per share, which was four times greater than the fair market value of our common stock on the date of grant, as determined contemporaneously by our board of directors, and is scheduled to vest over four years, with 25% of the shares scheduled to vest on October 21, 2021, and the remainder scheduled to vest ratably at the end of each subsequent month thereafter through October 21, 2024, subject to such advisor's continued service relationship with our company through the applicable vesting dates.

Equity Compensation Plan Information

Plan category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column(a)) (c)
Equity compensation plans approved by security holders	4,790,562	$ 2.28	66,050
Equity compensation plans not approved by security holders	294,117	28.29	—
Total	5,084,679	$ 3.79	66,050

As described above under “Item 11. Executive Compensation—2021 Equity Incentive Plan” and “Item 11. Executive Compensation—2021 Employee Stock Purchase Plan”, in connection with our initial public offering, our board of directors and stockholders approved two new equity compensation plans, the 201 Plan and the ESPP. The 2021 Plan and the ESPP became effective February 5, 2021. The table above does not include any amounts issuable under either the 2021 Plan or the ESPP because they were not in effect at December 31, 2020.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The following is a description of transactions since January 1, 2019 to which we have been a participant in which the amount involved exceeded or will exceed $120,000, and in which any of our directors, executive officers or holders of more than 5% of our voting stock, or any members of their immediate family, had or will have a direct or indirect material interest, other than equity and other compensation, termination, change in control and other arrangements which are described under “Executive Compensation.”

Series A-2 Preferred Stock Financing

In February 2019, we entered into a preferred stock purchase agreement with certain investors, including beneficial owners of greater than 5% of our voting stock and affiliates of members of our board of directors, pursuant to which we issued and sold an aggregate of 62,819,866 shares of our Series A-2 preferred stock. The purchase price per share of Series A-2 preferred stock was $0.40, and we received gross proceeds of approximately $23.3 million, including the conversion of the Convertible Notes at a discounted purchase price per share of $0.30.

Under the agreement, such investors were required to purchase up to an aggregate of 44,375,000 additional shares of our Series A-2 preferred stock upon our achievement of certain milestones or the determination by a specified threshold of investors to proceed with the milestone closing. In February 2020 we conducted the milestone closing and issued and sold to such investors an aggregate of 44,375,000 shares of Series A-2 preferred stock at a purchase price of $0.40 per share for aggregate gross proceeds of $17.8 million.

The table below sets forth the aggregate number of shares of Series A-2 preferred stock issued to our related parties:

Name	Series A-2 Preferred Stock (#)	Aggregate Purchase Price (Including Conversion of Convertible Notes) ($)
5AM Ventures VI, L.P.(1)	45,000,000	18,000,000
Entities affiliated with RA Capital Healthcare Fund, L.P.(2)	30,500,000	12,200,000
PureTech Health LLC(3)	21,694,866	6,833,460
The Trustees of Columbia University in the City of New York(4)	1,250,000	500,000

(1) Kush Parmar, the chairman of our board of directors, is one of the managing members of 5AM Partners VI, LLC, the general partner of 5AM Ventures VI, L.P. and, as a result, may be deemed to share voting and investment power with respect to the shares held by 5AM Ventures VI, L.P.

(2) Joshua Resnick, a member of our board of directors, is a managing director at RA Capital Management. RA Capital Healthcare Fund, L.P. and its affiliates.
(3) Bharatt Chowrira, a former member of our board of directors, is the president and chief of business and strategy of PureTech Health LLC.
(4) The Trustees of Columbia University in the City of New York held more than 5% of our voting stock at the time of the Series A-2 preferred stock financing.

Series B Preferred Stock Financing

In June 2020, we entered into a preferred stock purchase agreement with certain investors, including beneficial owners of greater than 5% of our voting stock and affiliates of members of our board of directors, pursuant to which we issued and sold to such investors an aggregate of 124,519,220 shares of our Series B preferred stock in June 2020 at a purchase price of $0.52 per share for aggregate gross proceeds of $64.7 million, and an aggregate of 87,259,605 additional shares of our Series B preferred stock in January 2021 at a purchase price of $0.52 per shares for aggregate gross proceeds of $45.4 million.

The table below sets forth the aggregate number of shares of Series B preferred stock issued to our related parties:

Name	Series B Preferred Stock (#)	Aggregate Purchase Price ($)
Entities affiliated with RA Capital Healthcare Fund, L.P.(1)	76,923,076	40,000,000
Entities affiliated with FMR, LLC(2)	37,259,615	19,375,000
Entities affiliated with 5AM Ventures VI, L.P.(3)	38,461,536	19,999,999
PureTech Health LLC(4)	1,923,076	1,000,000

(1) Joshua Resnick, a member of our board of directors, is a managing director at RA Capital Management. RA Capital Healthcare Fund, L.P. and its affiliates hold more than 5% of our voting stock.
(2) Entities affiliated with FMR, LLC collectively hold more than 5% of our voting stock.
(3) Kush Parmar, the chairman of our board of directors, is one of the managing members of 5AM Partners VI, LLC, the general partner of 5AM Ventures VI, L.P. and, as a result, may be deemed to share voting and investment power with respect to the shares held by 5AM Ventures VI, L.P.
(4) Bharatt Chowrira, a former member of our board of directors, is the president and chief of business and strategy of PureTech Health LLC. PureTech Health LLC holds more than 5% of our voting stock.

In connection with the closing of our IPO on February 9, 2021, all outstanding shares of our Series B preferred stock were converted into shares of our common stock at a ratio of 13.6-for-1 and the foregoing amounts are listed on a pre-conversion basis.

Director Affiliations

Some of our directors are affiliated with and serve on our board of directors as representatives of entities which beneficially own or owned 5% or more of our common stock, as indicated in the table below:

Director	Principal Stockholder
Kush Parmar, M.D., Ph.D.	5AM Ventures VI, L.P. and affiliates
Joshua Resnick, M.D.	RA Capital Healthcare Fund, L.P. and its affiliates

Participation in Initial Public Offering

In our IPO, funds affiliated with RA Capital Healthcare Fund, L.P., 5AM Ventures VI, L.P. and FMR, LLC, each of whom was one of our 5% stockholders at the time of our IPO, purchased 3,222,222, 555,555 and 1,195,566 shares of our common stock, respectively. Such purchases were made through the underwriters at the initial public offering price of $18.00 per share for an aggregate purchase price of $89.5 million.

Promissory Note with Robert Ang

In September 2019, we entered into a limited recourse promissory note with Dr. Ang, our President and Chief Executive Officer, pursuant to which we loaned him the principal amount of $497,920.10 to early exercise stock options. The note accrued interest at 1.5% compounding semi-annually and could be prepaid at any time without penalty. We forgave the principal amount and accrued interest under this promissory note in full in October 2020.

Consulting Agreement with Christopher Slapak Consulting LLC

In July 2019, we entered into a consulting agreement with Christopher Slapak Consulting LLC, an entity wholly owned by Christopher Slapak, who is now our Chief Medical Officer. Pursuant to the consulting agreement, Dr. Slapak agreed to provide services related to the customary job functions of a chief medical officer. In July 2020, Dr. Slapak joined us as our full-time Chief Medical Officer, at which point the consulting agreement was terminated. During the length of the consulting agreement, we paid Christopher Slapak Consulting LLC an aggregate of $0.44 million for consulting services and reimbursement of certain expenses.

Investors' Rights Agreement

We are a party to an amended and restated investors' rights agreement, or the Investors' Rights Agreement, dated as of June 30, 2020, with holders of our previously-outstanding preferred stock, including certain of our 5% stockholders and their affiliates and entities affiliated with certain of our officers and directors. This agreement provides these holders the right to demand that we file a registration statement or request that their shares be covered by a registration statement that we are otherwise filing.

Employment Arrangements

We have entered into offer letter agreements with each of our executive officers. For more information regarding our employment agreements with our named executive officers, see "Executive Compensation—Offer Letters and Potential Payments and Benefits Upon Termination or Change in Control."

Indemnification Agreements

Our amended and restated certificate of incorporation contains provisions limiting the liability of directors, and our amended and restated bylaws provide that we will indemnify each of our directors to the fullest extent permitted under Delaware law. Our amended and restated certificate of incorporation and amended and restated bylaws also provide our board of directors with discretion to indemnify our officers and employees when determined appropriate by the board.

In addition, we have entered into indemnification agreements with each of our directors and executive officers. For more information regarding these agreements, see “Executive Compensation—Limitations on Liability and Indemnification Matters.”

Related Person Transaction Policy

We have adopted a related person transaction policy that sets forth our procedures for the identification, review, consideration and approval or ratification of related person transactions, which policy became effective on February 4, 2021. For purposes of our policy only, a related person transaction will be a transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships, in which we and any related person are, were or will be participants in which the amount involved exceeds $120,000. Transactions involving compensation for services provided to us as an employee or director will not be covered by this policy. A related person will be any executive officer, director or beneficial owner of more than 5% of any class of our voting securities, including any of their immediate family members and any entity owned or controlled by such persons.

Under the policy, if a transaction has been identified as a related person transaction, including any transaction that was not a related person transaction when originally consummated or any transaction that was not initially identified as a related person transaction prior to consummation, our management must present information regarding the related person transaction to our audit committee, or, if audit committee approval would be inappropriate, to another independent body of our board of directors, for review, consideration and approval or ratification. The presentation must include a description of, among other things, the material facts, the interests, direct and indirect, of the related persons, the benefits to us of the transaction and whether the transaction is on terms that are comparable to the terms available to or from, as the case may be, an unrelated third party or to or from employees generally. Under the policy, we will collect information that we deem reasonably necessary from each director, executive officer and, to the extent feasible, significant stockholder to enable us to identify any existing or potential related-person transactions and to effectuate the terms of the policy. In addition, under our code of business conduct and ethics, our employees and directors will have an affirmative responsibility to disclose any transaction or relationship that reasonably could be expected to give rise to a conflict of interest. In considering related person transactions, our audit committee, or other independent body of our board of directors, will take into account the relevant available facts and circumstances including:

- the risks, costs and benefits to us;
- the impact on a director’s independence in the event that the related person is a director, immediate family member of a director or an entity with which a director is affiliated;
- the availability of other sources for comparable services or products; and
- the terms available to or from, as the case may be, unrelated third parties or to or from employees generally.

The policy will require that, in determining whether to approve, ratify or reject a related person transaction, our audit committee, or other independent body of our board of directors, must consider, in light of known circumstances, whether the transaction is in, or is not inconsistent with, our best interests and those of our stockholders, as our audit committee, or other independent body of our board of directors, determines in the good faith exercise of its discretion.

All of the transactions described in this section were entered into prior to the adoption of this policy. Although we have not had a written policy for the review and approval of transactions with related persons, our board of directors has historically reviewed and approved any transaction where a director or officer had a financial interest, including the transactions described above. Prior to approving such a transaction, the material facts as to a director’s or officer’s relationship or interest in the agreement or transaction were disclosed to our board of directors. Our board of directors took this information into account when evaluating the transaction and in determining whether such transaction was fair to us and in the best interest of all our stockholders.

Director Independence

Applicable Nasdaq rules (the "Nasdaq Listing 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, the Nasdaq Listing Rules require that, subject to specified exceptions, each member of a listed company's audit, compensation and nominating and corporate governance committees be independent and that audit committee members also satisfy independence criteria set forth in Rule 10A-3 under the Securities Exchange Act of 1934, as amended (the "Exchange Act"). The Nasdaq independence definition includes a series of objective tests, such as that the director is not, and has not been for at least three years, one of our employees, and that neither the director nor any of his or her family members has engaged in various types of business dealings with us. In addition, 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.

Our board of directors has determined that all of our directors other than Robert Ang, by virtue of his employment with us, are "independent directors" as defined under applicable Nasdaq rules. In making such determination, our board of directors considered the current and prior relationships that each such 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 director and the transactions described in this section.

Item 14. Principal Accounting Fees and Services.

The following table summarizes the fees of Ernst & Young LLP, our independent registered public accounting firm, billed us for each of the last two fiscal years.

	Year Ended December 31,	
	2020	2019
Audit Fees (1)	$ 870,000	$ 50,000
Audit-Related Fees	—	—
Tax Fees	—	—
All Other Fees	—	—
	$ 870,000	$ 50,000

(1) Audit fees consist of fees billed for professional services by Ernst & Young LLP for audit and quarterly review of our consolidated financial statements and review of the registration statement on Form S-1 for our initial public offering, and related services that are normally provided in connection with statutory and regulatory filings or engagements.

The aggregate fees included in the Audit Fees are those fees billed for the fiscal year.

Pre-Approval Policies and Procedures

The audit committee of our board of directors has adopted policies and procedures for the pre-approval of audit and non-audit services for the purpose of maintaining the independence of our independent auditor. We may not engage our independent auditor to render any audit or non-audit service unless either the service is approved in advance by the audit committee, or the engagement to render the service is entered into pursuant to the audit committee's pre-approval policies and procedures.

From time to time, our audit committee may pre-approve services that are expected to be provided to us by the independent auditor during the following 12 months. At the time such pre-approval is granted, the audit committee must identify the particular pre-approved services in a sufficient level of detail so that our management will not be called upon to make a judgment as to whether a proposed service fits within the pre-approved services and, at each regularly scheduled meeting of the audit committee following such approval, management or the independent auditor shall report to the audit committee regarding each service actually provided to us pursuant to such pre-approval.

The audit committee has delegated to its chairman the authority to grant pre-approvals of audit or non-audit services to be provided by the independent auditor, provided, that such services are no more than $50,000 per calendar year. Any approval of services by the chairman of the audit committee is reported to the committee at its next regularly scheduled meeting.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(1) For a list of the financial statements included herein, see Index to the Consolidated Financial Statements on page F-1 of this Annual Report on Form 10-K, incorporated into this Item by reference.

(2) Schedules have been omitted since they are either not required or not applicable or the information is otherwise included herein.

(3) Exhibits

Exhibit Number	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit Number	Filing Date	
3.1	Amended and Restated Certificate of Incorporation of the Registrant	8-K	001-39979	3.1	February 9, 2021	
3.2	Amended and Restated Bylaws of the Registrant	8-K	001-39979	3.2	February 9, 2021	
4.1	Form of Common Stock Certificate of the Registrant	S-1/A	333-252175	4.1	February 1, 2021	
4.2	Amended and Restated Investors' Rights Agreement, by and among the Registrant and certain of its stockholders, dated June 30, 2020	S-1/A	333-252175	4.2	February 1, 2021	
10.1†	Exclusive License Agreement, by and between the Registrant and The Trustees of Columbia University in the City of New York ("Columbia"), dated April 28, 2016	S-1	333-252175	10.1	January 15, 2021	
10.2†	First Amendment to Exclusive License Agreement, by and between the Registrant and Columbia, dated February 12, 2019	S-1	333-252175	10.2	January 15, 2021	
10.3†	Patent License Agreement, by and between the Registrant and the U.S. Department of Health and Human Services, as represented by the National Cancer Institute, dated October 30, 2020	S-1	333-252175	10.3	January 15, 2021	
10.4	Lease Agreement, by and between the Registrant and PPF Off 100 Cambridge Park Drive, LLC, dated December 17, 2019	S-1	333-252175	10.4	January 15, 2021	

Exhibit Number	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit Number	Filing Date	
10.5+	2015 Stock Incentive Plan and Forms of Option Grant Agreements, Exercise Notices and Restricted Stock Agreement	S-1	333-252175	10.5	January 15, 2021	
10.6+	2021 Equity Incentive Plan and Forms of Stock Option Grant Notice, Stock Option Agreement, Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement	S-1/A	333-252175	10.6	February 1, 2021	
10.7+	2021 Employee Stock Purchase Plan	S-1/A	333-252175	10.7	February 1, 2021	
10.8+	Form of Indemnification Agreement with Executive Officers and Directors	S-1	333-252175	10.8	January 15, 2021	
10.9+	Offer Letter, by and between the Registrant and Robert Ang, dated June 28, 2019	S-1	333-252175	10.9	January 15, 2021	
10.10+	Offer Letter, by and between the Registrant and Sadik Kassim, dated August 12, 2019	S-1	333-252175	10.10	January 15, 2021	
10.11+	Offer Letter, by and between the Registrant and Christopher Slapak, dated July 2, 2020	S-1	333-252175	10.11	January 15, 2021	
10.12+	Offer Letter, by and between the Registrant and Nathan Jorgensen, dated March 20, 2020	S-1	333-252175	10.12	January 15, 2021	
10.13+	Offer Letter, by and between the Registrant and Tirtha Chakraborty, dated August 28, 2019	S-1	333-252175	10.13	January 15, 2021	
10.14+	Non-Employee Director Compensation Policy	S-1/A	333-252175	10.14	February 1, 2021	
10.15+	Executive Severance and Change in Control Benefits Plan	S-1/A	333-252175	10.15	February 1, 2021	
21.1	Subsidiaries of the Registrant	S-1	333-252175	21.1	January 15, 2021	
23.1	Consent of Ernst & Young LLP					X

Exhibit Number	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit Number	Filing Date	
31.1*	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
31.2*	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
32.1*	Certification of Principal Executive Officer and Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002					X

+ Indicates management contract or compensatory plan.

† Portions of the exhibit have been omitted as the Registrant has determined that: (i) the omitted information is not material; and (ii) the omitted information is the type that the Registrant treats as private or confidential.

***** This certification will not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liability of that section.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized**.**

VOR BIOPHARMA INC.

Date: March 25, 2021

By: /s/ Robert Ang
Robert Ang, M.B.B.S., M.B.A.
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Report has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Name	Title	Date
/s/ Robert Ang Robert Ang, M.B.B.S., M.B.A.	President, Chief Executive Officer and Director (Principal Executive Officer)	March 25, 2021
/s/ Nathan Jorgensen Nathan Jorgensen, Ph.D., M.B.A.	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 25, 2021
/s/ Daniella Beckman Daniella Beckman	Director	March 25, 2021
/s/ David C. Lubner David C. Lubner	Director	March 25, 2021
/s/ Sven (Bill) Ante Lundberg Sven (Bill) Ante Lundberg, M.D.	Director	March 25, 2021
/s/ Kush M. Parmar Kush M. Parmar, M.D., Ph.D.	Director	March 25, 2021
/s/ Matthew Patterson Matthew Patterson	Director	March 25, 2021
/s/ Joshua Resnick Joshua Resnick, M.D.	Director	March 25, 2021

VOR BIOPHARMA INC.
INDEX TO FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Vor Biopharma Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Vor Biopharma Inc. (the "Company") as of December 31, 2020 and 2019, and the related consolidated statements of operations and comprehensive loss, redeemable convertible preferred stock and stockholders' deficit and cash flows for the years then ended 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 the years then ended, 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
March 25, 2021

VOR BIOPHARMA 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	$ 48,539	$ 6,466
Prepaid expenses	467	868
Other current assets	100	205
Total current assets	49,106	7,539
Restricted cash	1,559	1,559
Property and equipment, net	4,728	728
Operating lease right-of-use assets	17,117	—
Other assets	3,398	—
Total assets	$ 75,908	$ 9,826
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Deficit		
Current liabilities:		
Accounts payable	$ 2,361	$ 693
Accrued expenses	6,260	938
Operating lease liability	863	—
Other current liabilities	723	555
Total current liabilities	10,207	2,186
Long-term liabilities:		
Operating lease liabilities—non current	17,430	—
Total long-term liabilities	17,430	—
Total liabilities	27,637	2,186
Commitments and Contingencies (Note 12)		
Series A-1 redeemable convertible preferred stock, $0.0001 par value; 20,000,000 shares authorized, issued, and outstanding as of December 31, 2020 and 2019 (liquidation preference of $4,000 as of December 31, 2020)	2	2
Series A-2 redeemable convertible preferred stock, $0.0001 par value; 107,194,866 shares authorized as of December 31, 2020 and 2019; 107,194,866 and 62,819,866 shares issued and outstanding as of December 31, 2020 and 2019, respectively (liquidation preference of $42,878 as of December 31, 2020)	42,786	25,067
Series B redeemable convertible preferred stock, $0.0001 par value; 211,778,825 shares and 0 shares authorized as of December 31, 2020 and 2019, respectively; 124,519,220 shares and 0 shares issued and outstanding as of December 31, 2020 and 2019, respectively (liquidation preference of $64,750 as of December 31, 2020)	64,548	—
Stockholders' deficit:		
Common stock, $0.0001 par value; 420,000,000 and 161,000,000 shares authorized as of December 31, 2020 and 2019, respectively; 893,231 and 528,357 shares issued and 505,074 and 119,936 outstanding as of December 31, 2020 and 2019, respectively	1	—
Additional paid-in capital	2,158	458
Accumulated deficit	(61,224)	(17,887)
Total stockholders' deficit	(59,065)	(17,429)
Total liabilities, redeemable convertible preferred stock and stockholders' deficit	$ 75,908	$ 9,826

The accompanying notes are an integral part of these financial statements

VOR BIOPHARMA 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	$ 31,618	$ 6,200
General and administrative	11,748	4,217
Total operating expenses	$ 43,366	10,417
Loss from operations	$ (43,366)	(10,417)
Other income (expense):		
Interest income	29	154
Interest expense related to convertible notes	—	(608)
Change in fair value of derivative liabilities	—	32
Total other income (expense)	29	(422)
Net loss and comprehensive loss	$ (43,337)	$ (10,839)
Cumulative dividends on redeemable convertible preferred stock	(5,925)	(1,773)
Net loss attributable to common stockholders	$ (49,262)	$ (12,612)
Net loss per share attributable to common stockholders, basic and diluted	$ (230.57)	$ (109.70)
Weighted-average common shares outstanding, basic and diluted	213,658	114,961

The accompanying notes are an integral part of these financial statements

VOR BIOPHARMA INC.
CONSOLIDATED STATEMENTS OF REDEEMABLE CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT

(in thousands, except share amounts)	Series A-1 Preferred Stock		Series A-2 Preferred Stock		Series B Preferred Stock		Common Stock		Additional Paid-In Capital	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount			
Balance, December 31, 2018	20,000,000	$ 2	—	$ —	—	$ —	106,960	$ —	$ 279	$ (7,048)	$ (6,769)
Issuance of Series A-2 Redeemable Convertible Preferred Stock	—	—	44,375,000	17,692	—	—	—	—	—	—	—
Conversion of convertible notes to Series A-2 Redeemable Convertible Preferred Stock	—	—	18,444,866	7,375	—	—	—	—	—	—	—
Issuance of common stock upon exercise of stock options	—	—	—	—	—	—	12,408	—	7		7
Vesting of restricted shares	—	—	—	—	—	—	568	—	—		—
Stock-based compensation expense	—	—	—	—	—	—	—	—	172		172
Net loss	—	—	—	—	—	—	—	—	—	(10,839)	(10,839)
Balance, December 31, 2019	20,000,000	$ 2	62,819,866	$ 25,067	—	$ —	119,936	$ —	$ 458	$ (17,887)	$ (17,429)
Issuance of Series A-2 Redeemable Convertible Preferred Stock	—	—	44,375,000	17,719	—	—	—	—	—	—	—
Issuance of Series B Redeemable Convertible Preferred Stock	—	—	—	—	124,519,220	64,548	—	—	—	—	—
Issuance of common stock upon exercise of stock options	—	—	—	—	—	—	385,138	1	358	—	359
Stock-based compensation expense	—	—	—	—	—	—	—	—	1,342	—	1,342
Net loss	—	—	—	—	—	—	—	—	—	(43,337)	(43,337)
Balance, December 31, 2020	20,000,000	$ 2	107,194,866	$ 42,786	124,519,220	$ 64,548	505,074	$ 1	$ 2,158	$ (61,224)	$ (59,065)

The accompanying notes are an integral part of these financial statements

VOR BIOPHARMA INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)	Year Ended December 31, 2020	2019
Cash flows from operating activities		
Net loss	$ (43,337)	$ (10,839)
Adjustments to reconcile net loss to net cash used in operations:		
Depreciation expense	605	91
Non-cash lease expense	782	—
Change in fair value of derivative liabilities	—	(32)
Non-cash interest expense	—	608
Stock-based compensation	1,342	172
Changes in operating assets and liabilities:		
Operating lease liability	393	—
Prepaid expenses and other current assets	606	(1,067)
Accounts payable and accrued expenses	5,820	1,212
Other assets	(2,503)	—
Net cash used in operating activities	(36,292)	(9,855)
Cash flow from investing activities		
Purchases of property and equipment	(4,161)	(748)
Net cash used in investing activities	(4,161)	(748)
Cash flow from financing activities		
Proceeds from issuance of redeemable convertible preferred stock	82,267	17,692
Proceeds from stock option exercises	259	7
Net cash provided by financing activities	82,526	17,699
Net increase in cash, cash equivalents and restricted cash	42,073	7,096
Cash, cash equivalents and restricted cash, beginning of period	$ 8,025	929
Cash, cash equivalents and restricted cash, end of period	$ 50,098	$ 8,025
Supplemental disclosure of non-cash activities		
Conversion of notes payable and accrued interest into convertible preferred stock	$ —	$ 7,375
Deferred offering costs included in accounts payable and accrued expenses	$ 896	$ —
Purchases of property and equipment in accounts payable	$ 444	$ —
Operating right-of-use assets and operating lease liability recorded upon lease commencement	$ 17,899	$ —

A reconciliation of the cash, cash equivalents and restricted cash reported within the consolidated balance sheets that sum to the total of the same amounts shown in the statements of cash flows is as follows:

(in thousands)	Year Ended December 31, 2020	2019
Cash and cash equivalents	$ 48,539	$ 6,466
Restricted cash	1,559	1,559
Total cash, cash equivalents and restricted cash as shown on the statements of cash flows	$ 50,098	$ 8,025

The accompanying notes are an integral part of these financial statements

1. Nature of the Business

Vor Biopharma Inc. (the "Company" or "Vor") is a cell therapy company that combines a novel patient engineering approach with targeted therapies to provide a single company solution for patients suffering from hematological malignancies. The Company's proprietary platform leverages its expertise in hematopoietic stem cell ("HSC") biology, genome engineering and targeted therapy development to genetically modify HSCs to remove surface targets expressed by cancer cells. Vor is headquartered in Cambridge, Massachusetts. The Company was incorporated on December 30, 2015 as a wholly owned subsidiary of PureTech Health LLC ("PureTech").

Initial Public Offering

On February 9, 2021, the Company completed an initial public offering ("IPO") of its common stock. At the closing of the IPO, the Company issued and sold 11,302,219 shares of its common stock, which included 1,474,202 shares sold pursuant to the exercise of the underwriters' over-allotment option, at a public offering price of $18.00 per share. The Company received net proceeds of approximately $186.3 million from the IPO, after deducting underwriters' discounts and commissions and other offering expenses paid by the Company.

Upon closing of the IPO, all shares of the Company's Series A-1, A-2 and B redeemable convertible preferred stock then outstanding automatically converted into an aggregate of 24,924,501 shares of common stock. Upon conversion of the redeemable convertible preferred stock, the Company reclassified the carrying value of the redeemable convertible preferred stock to common stock and additional paid-in capital.

In connection with the IPO, the Company filed an amended and restated certificate of incorporation. The amended and restated certificate amends and restates the Company's certificate of incorporation in its entirety to, among other things authorize the Company to issue up to 400,000,000 shares of common stock, $0.0001 par value per share, and 10,000,000 shares of preferred stock, $0.0001 par value per share, all of which shares of preferred stock will be undesignated. In addition, the Company's board of directors may establish the rights and preferences of the preferred stock from time to time.

Reverse Stock Split

On January 29, 2021, the Company effected a 13.6-for-1 reverse stock split of the Company's common stock. All shares, stock options, and per share information in the consolidated financial statements were previously adjusted to reflect the reverse stock split. There was no change in the par value and authorized number of shares of the Company's common stock.

Risks and Uncertainties

The Company is subject to a number of risks common to development stage companies in the biotechnology industry, including, but not limited to, risks of failure of preclinical studies and clinical trials, dependence on key personnel, protection of proprietary technology, reliance on third party organizations, risks of obtaining regulatory approval for any product candidate that it may develop, development by competitors of technological innovations, compliance with government regulations, the impact of the COVID-19 pandemic, and the need to obtain additional financing.

The Company anticipates that it will continue to incur significant operating losses for the next several years as it continues to develop its product candidates. The Company believes that its existing cash and cash equivalents, and marketable securities at December 31, 2020 will be sufficient to allow the Company to fund its current operations through at least a period of one year after the date the financial statements are issued.

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America ("GAAP") and include all adjustments necessary for the fair presentation of the Company's financial position and results of its operations for the periods presented. 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 ASU of the Financial Accounting Standards Board ("FASB").

As noted above, the Company was wholly owned by PureTech. Prior to February 12, 2019, PureTech provided certain services and shared costs from its consolidated businesses with the Company as part of a formal intercompany services agreement. Through February 12, 2019, costs have been allocated to the Company for the purposes of preparing the consolidated financial statements based on a specific identification basis or, when specific identification is not practicable, a proportional cost allocation method which allocates expenses based upon the percentage of employee time and research and development effort expended on the Company's business as compared to total employee time and research and development incurred by PureTech. The proportional use basis adopted to allocate shared costs is in accordance with the guidance of SEC Staff Accounting Bulletin ("SAB") Topic 1B, *Allocation Of Expenses And Related Disclosure In Financial Statements Of Subsidiaries, Divisions Or Lesser Business Components Of Another Entity*. Management has determined that the method of allocating costs to the Company is reasonable. Cost allocation was no longer required subsequent to February 12, 2019, when PureTech no longer controlled the Company and it began standalone operations.

Management believes that the consolidated statements of operations include a reasonable allocation of costs and expenses incurred by PureTech, which benefited the Company. However, such amounts may not be indicative of the actual level of costs and expenses that would have been incurred by the Company if it had operated as an independent company or of the costs and expenses expected to be incurred in the future. Management has not presented an estimate of what the expenses of the Company would have been on a standalone basis as it was not practicable to make a reasonable estimate. As such, the 2019 financial information herein may not necessarily reflect the financial position, results of operations and cash flows of the Company expected in the future or what it would have been had it been an independent company during the periods presented.

Use of Estimates

The preparation of the consolidated financial statements in conformity with GAAP requires the Company's management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the consolidated financial statements and the reported amount of expenses during the reporting period. Actual results could differ from those estimates. Management considers many factors in selecting appropriate financial accounting policies in developing the estimates and assumptions that are used in the preparation of the consolidated financial statements. Management must apply significant judgment in this process. Management's estimation process often may yield a range of potentially reasonable estimates and management must select an amount that falls within that range of reasonable estimates. Estimates are used in the following areas, among others: estimating the fair value of the Company's common stock; stock-based compensation expense; accrued expenses; research and development expenses; and income taxes.

Segments

Operating segments are defined as components of an enterprise for which separate and discrete information is available for evaluation by the chief operating decision-maker in deciding how to allocate resources and assess performance. The Company has one operating segment. The Company's chief operating decision maker, its Chief Executive Officer, manages the Company's operations on an aggregate basis for the purpose of allocating resources. All of the Company's long-lived assets are held in the United States.

Foreign Currency Transaction Gains or Losses

Transactions denominated in foreign currencies are recorded in U.S. dollars on the date of those transactions. Adjustments arising from foreign currency transactions between the purchase and the settlement dates are reflected in the consolidated statement of operations and comprehensive loss as a component of operating expenses.

Cash and Cash Equivalents

The Company considers investments purchased with an original maturity date of ninety days or less from the date of purchase to be cash equivalents. Cash and cash equivalents include cash held in banks and amounts held in money market funds. Cash equivalents are stated at cost, which approximates market value.

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. During the year ended December 31, 2020, the Company incurred $1.6 million in deferred offering costs that are included in other assets on the consolidated balance sheet. The Company did not capitalize any deferred offering costs during the year ended December 31, 2019.

Restricted Cash

The Company had $1.6 million of restricted cash in the form of a letter of credit related to a lease at each of December 31, 2020 and 2019.

Comprehensive loss

Comprehensive loss includes net loss, as well as other changes in stockholders' deficit that result from transactions and economic events other than those with stockholders. The Company's comprehensive loss was equal to net loss for the years ended December 31, 2020 and 2019.

Preferred Stock

The Company applies the guidance enumerated in FASB ASC Topic 480, *Distinguishing Liabilities from Equity* ("ASC 480"), when determining the classification and measurement of its preferred stock. Preferred stock subject to mandatory redemption (if any) are classified as liability instruments and are measured at fair value. The Company classifies conditionally redeemable preferred stock (if any), which includes preferred stock that features redemption rights that are either within the control of the holder or subject to redemption upon the occurrence of uncertain events not solely within the Company's control, as temporary equity.

Concentrations of Credit Risk

Financial instruments that potentially expose the Company to concentrations of credit risk consist primarily of cash and cash equivalents. Periodically, the Company maintains deposits in accredited financial institutions in excess of federally insured limits. The Company deposits its cash in financial institutions that it believes have high credit quality and has not experienced any losses on such accounts and does not believe it is exposed to any unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

Fair Value Measurements

Certain assets and liabilities are carried at fair value under GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date.

Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

To the extent that the valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair value requires more judgment. Accordingly, the degree of judgment exercised by the Company in determining fair value is greatest for instruments categorized in 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.

Financial instruments consist of cash and cash equivalents, restricted cash, accounts payable and accrued expenses. These financial instruments are stated at their respective historical carrying values which approximate fair value due to their short-term nature.

Derivative Instruments

The Company recognizes all derivative instruments as either assets or liabilities in the consolidated balance sheet at their respective fair values. The Company evaluates its debt and equity issuances to determine if those contracts or embedded components of those contracts qualify as derivatives requiring separate recognition in the Company's consolidated financial statements. The result of this accounting treatment is that the fair value of the embedded derivative is revalued as of each reporting date and recorded as a derivative liability, and the change in fair value during the reporting period is recorded in change in fair value of derivative liabilities in the consolidated statements of operations. In circumstances where the embedded conversion option in a convertible instrument is required to be bifurcated and there are also other embedded derivative instruments in the convertible instrument that are required to be bifurcated, the bifurcated derivative instruments are accounted for as a single, compound derivative instrument. The classification of derivative instruments, including whether such instruments should be recorded as liabilities or as equity, is reassessed at the end of each reporting period. Derivative instrument liabilities are classified in the consolidated balance sheet as current or non-current based on whether or not net-cash settlement of the derivative instrument is expected within twelve months of the balance sheet date.

Convertible Notes- Related Party

The Company accounts for its convertible notes using an amortized cost model. Debt issuance costs and the initial fair value of bifurcated compound derivatives reduce the initial carrying amount of the convertible notes. The carrying value is accreted to the stated principal amount at the expected conversion date using the effective-interest method with a corresponding charge to interest expense. Debt discounts are presented on the consolidated balance sheet as a direct deduction from the carrying amount of that related debt.

Property and Equipment, Net

Property and equipment, net is recorded at cost less accumulated depreciation. Depreciation expense is recorded using the straight-line method over the estimated useful life of the related asset, which are as follows:

	Estimated Useful Life
Laboratory equipment	5 years
Furniture and equipment	5 years
Leasehold improvements	Shorter of remaining lease term or useful life

Purchased assets that are not yet in service are recorded to construction-in-process and no depreciation expense is recorded. Once they are placed in service, they are reclassified to the appropriate asset class. When assets are retired or otherwise disposed of, the assets and related accumulated depreciation are eliminated from the accounts and any resulting gain or loss is reflected in the Company's consolidated statements of operation and comprehensive loss. Expenditures for maintenance and repairs are expensed as incurred.

Impairment of Long-Lived Assets

Long-lived assets consist of property and equipment. The Company continually evaluates whether events or circumstances have occurred that indicate that the estimated remaining useful life of its long-lived assets may warrant revision or that the carrying value of these assets may not be recoverable. If circumstances require that a long-lived asset or asset group be tested for impairment, the Company first compares the estimated undiscounted future cash flows expected to result from the use or disposition of that asset or asset group to its carrying amount. If the carrying amount of the long-lived asset or asset group is not recoverable on an undiscounted cash flow basis, an impairment loss would be recognized to the extent the carrying value exceeds its fair value. Fair value is determined through various valuation techniques including discounted cash flow models, quoted market prices and third-party independent appraisals, as considered necessary.

Leases

Effective January 1, 2019, the Company adopted and accounts for its leases under ASC 842, *Leases* ("ASC 842"), using the modified retrospective transition approach. At the inception of an arrangement, the Company determines whether the arrangement is or contains a lease. Leases with a term greater than one year are recognized on the consolidated balance sheet as a right-of-use ("ROU") asset and current and non-current lease liabilities, as applicable. The Company has made an accounting policy election, known as the short-term lease recognition exemption, which allows the Company to not recognize ROU assets and lease liabilities that arise from short-term leases (12 months or less) for any class of underlying asset. The Company typically only includes an initial lease term in its assessment of a lease arrangement. Options to renew or options to cancel a lease are not included in the Company's assessment unless there is reasonable certainty that the Company will renew or will not cancel, respectively. The Company monitors its material leases on a quarterly basis.

Operating lease liabilities and their corresponding ROU assets are recorded based on the present value of future lease payments over the expected remaining lease term. Lease cost for operating leases is recognized on a straight-line basis over the lease term as an operating expense. Certain adjustments to the ROU asset may be required for items such as lease prepayments or incentives received. The interest rate implicit in lease contracts is typically not readily determinable. As a result, the Company utilizes its incremental borrowing rate, which reflects the fixed rate at which the Company could borrow on a collateralized basis the amount of the lease payments in the same currency, for a similar term, in a similar economic environment.

The Company has elected to account for the lease and non-lease components together for existing classes of underlying assets.

Research and Development

Research and development expenses include costs directly attributable to the conduct of the Company's research and development programs.

Expenditures relating to research and development are expensed in the period incurred. Nonrefundable advance payments for goods and services that will be used in future research and development activities are expensed when the activity has been performed or when the goods have been received rather than when the payment is made.

Costs incurred in obtaining licenses are recognized as research and development expense as incurred if the license has no alternative use.

Accrued Research and Development Expenses

The Company has entered into various research and development related contracts, including contracts with third-party contract research organizations and contract manufacturing organizations. These agreements are cancelable, and related payments are recognized as research and development expenses as incurred. The Company records accrued liabilities for estimated ongoing research costs. When evaluating the adequacy of the accrued liabilities, the Company analyzes the progress of the studies, including the phase or completion of events, invoices received and contracted costs. Significant judgments and estimates are made in determining the accrued balances at the end of any reporting period. Actual results could differ from the Company's estimates. To date, the Company's historical accrual estimates have not been materially different from the actual costs.

Stock-Based Compensation Expense

The Company accounts for stock-based compensation under the provisions of ASC 718-10, *Compensation—Stock Compensation* ("ASC 718-10"), which requires all share-based payments to employees, non-employees and directors, including grants of stock options and restricted stock, to be recognized in the consolidated statements of operations and comprehensive loss based on their fair values on the date of grant over the requisite service period, which is generally the vesting period of the respective award. Forfeitures are accounted for as they occur. Generally, the Company issues awards with only service-based vesting conditions and records the expense for these awards using the straight-line method. The Company classifies stock-based compensation expense in the same manner in which the award recipient's payroll or service provider's costs are classified. Share-based payments that contain performance conditions are recognized when such conditions are probable of being achieved.

The fair value of each restricted common stock award is estimated on the date of grant based on the fair value of the Company's common stock on that same date.

The fair value of each option grant is estimated on the date of grant using the Black-Scholes option pricing model, which requires inputs based on certain subjective assumptions, including the following:

- *Fair Value of Common Stock*—See the discussion below.
- *Expected Term*—The expected term represents the period that the stock-based awards are expected to be outstanding. The Company uses the simplified method to determine the expected term, which is based on the average of the time-to-vesting and the contractual life of the options.
- *Expected Volatility*—Because the Company has been privately held and does not have any trading history for its common stock as of December 31, 2020, the expected volatility was estimated based on the average volatility for comparable publicly traded biotechnology companies over a period equal to the expected term of the stock option grants. The comparable companies were chosen based on the similar size, stage in life cycle or area of specialty. The Company will continue to apply this process until a sufficient amount of historical information regarding the volatility of its own stock price becomes available.

- *Risk-Free Interest Rate*—The risk-free interest rate is based on the U.S. Treasury zero coupon issues in effect at the time of grant for periods corresponding with the expected term of the awards.
- *Dividend Yield*—The Company has never paid dividends on its common stock and has no plans to pay dividends on its common stock. Therefore, the Company used an expected dividend yield of zero.

As there is no public market for the Company's common stock as of December 31, 2020, the estimated fair value of common stock was determined by the Company's board of directors as of the date of each option grant, with input from management, considering third-party valuations of its common stock as well as the Company's board of directors' assessment of additional objective and subjective factors that it believed were relevant and which may have changed from the date of the most recent third-party valuation through the date of the grant. These objective and subjective factors include: (i) prices paid for the Company's redeemable convertible preferred stock, and the rights, preferences, and privileges of the Company's redeemable convertible preferred stock and common stock; (ii) the Company's stage of development; (iii) the fact that the grants of stock-based awards related to illiquid securities in a private company; and (iv) the likelihood of achieving a liquidity event for the common stock underlying the stock-based awards, such as an initial public offering or sale of the Company, given prevailing market conditions. These third-party valuations were performed in accordance with the guidance outlined in the American Institute of Certified Public Accountants' Accounting and Valuation Guide, *Valuation of Privately Held Company Equity Securities Issued as Compensation*. Each valuation methodology includes estimates and assumptions that require the Company's judgment. The methodology utilized to estimate the fair value of the Company's common stock was the option-pricing method ("OPM") to back-solve the estimated value of the Company's equity and corresponding value of the Company's common stock.

Income Taxes

The Company accounts for income taxes using the asset and liability approach. Deferred tax assets and liabilities represent future tax consequences of temporary differences between the financial statement carrying amounts and the tax basis of assets and liabilities and for loss carryforwards using enacted tax rates expected to be in effect in the years in which the differences reverse. A valuation allowance is established to reduce deferred tax assets to the amounts expected to be realized. The Company also recognizes a tax benefit from uncertain tax positions only if it is "more likely than not" that the position is sustainable based on its technical merits. The Company accounts for interest or penalties related to uncertain tax positions as part of its provision for income taxes. To date, the Company has not incurred interest and penalties related to uncertain tax positions. Should such costs be incurred, they would be classified as a component of provision for income taxes.

Net Loss Per Share

Net loss attributable to common stockholders is equal to the net loss for the period, as adjusted for cumulative dividends on redeemable convertible preferred stock, for the respective period.

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 during the reporting period, without consideration for potentially dilutive securities. Diluted 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 and potentially dilutive securities outstanding during the period determined using the treasury-stock and if-converted methods. For purposes of the diluted net loss per share attributable to common stockholders calculation, redeemable convertible preferred stock, restricted stock and stock options considered to be potentially dilutive securities were excluded from the calculation of diluted net loss per share attributable to common stockholders because their effect would be anti-dilutive and therefore, basic and diluted net loss per share attributable to common stockholders were the same for all reporting periods presented.

Recent Accounting Pronouncements

From time to time, new accounting pronouncements are issued and adopted by the Company as of the specified effective date. Unless otherwise discussed, the impact of recently issued standards that are not yet effective

will not have a material impact on the Company's consolidated financial statements upon adoption. Under the Jumpstart Our Business Startups Act of 2012, as amended (the "JOBS Act"), the Company meets the definition of an emerging growth company and has elected to take advantage of the extended transition period for complying with certain new or revised accounting standards pursuant to Section 107(b) of the JOBS Act. As noted below, certain new or revised accounting standards were early adopted.

Recently Issued Accounting Pronouncements Not Yet Adopted

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* which has been subsequently amended by ASU 2018-19, ASU 2019-04, ASU 2019-05, ASU 2019-10, ASU 2019-11 and ASU 2020-03 ("ASU 2016-13"). This standard significantly changes the impairment model for most financial assets and certain other instruments and will require immediate recognition of estimated credit losses expected to occur over the remaining life of many financial assets, which will generally result in earlier recognition of allowances for credit losses on loans and other financial instruments. The Company is currently evaluating the impact of this new guidance on the Company's consolidated financial statements and related disclosures but does not expect the adoption of this standard to be material. Additionally, the Company plans to adopt this standard on January 1, 2023, unless it no longer meets the smaller reporting company definition.

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740)*, which removes certain exceptions from the guidance and simplifies the accounting for income taxes in certain areas. This standard will be effective beginning January 1, 2021. The Company does not expect that this standard will have a material impact to the Company's consolidated financial statements.

3. Fair Value Measurements

The following tables present information about the Company's financial assets and liabilities measured at fair value on a recurring basis:

	December 31, 2020			
(in thousands)	**Level 1**	**Level 2**	**Level 3**	**Total**
Assets				
Money market fund	$ 41,036	$ —	$ —	$ 41,036
Total	$ 41,036	$ —	$ —	$ 41,036

	December 31, 2019			
(in thousands)	**Level 1**	**Level 2**	**Level 3**	**Total**
Assets				
Money market fund	$ 6,280	$ —	$ —	$ 6,280
Total	$ 6,280	$ —	$ —	$ 6,280

During the years ended December 31, 2020 and 2019, there were no transfers between levels. The fair value of the Company's cash equivalents, consisting of a money market fund, is based on quoted market prices in active markets with no valuation adjustment.

Convertible Notes Derivative Liabilities

The fair value of the derivative liabilities recognized in connection with the Company's convertible notes were determined based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The fair value of the derivative liabilities was determined using Monte Carlo simulations, which considered as inputs the type, timing and probability of a future equity financing or occurrence of a change-of-control event and related cash settlement of the notes; the potential amount of the payment under each of these potential settlement scenarios; and the risk-adjusted discount rate reflecting the expected risk profile for each of the potential settlement scenarios.

The following table provides a roll forward of the aggregate fair value of the Company's derivative liabilities, for which fair value is determined using Level 3 inputs:

(in thousands)	
Balance at December 31, 2018	$ 1,873
Change in fair value	(32)
Conversion of the convertible notes into Series A-2 redeemable convertible preferred stock	(1,841)
Balance at December 31, 2019	$ —

4. Property and Equipment, Net

Property and equipment, net consisted of the following:

	December 31,	
(in thousands)	2020	2019
Furniture and equipment	$ 40	$ 6
Laboratory equipment	5,247	843
Computer equipment	167	—
Property and equipment, gross	5,454	849
Accumulated depreciation	(726)	(121)
Property and equipment, net	$ 4,728	$ 728

Depreciation expense for the years ended December 31, 2020 and 2019 was approximately $0.6 million and $0.1 million, respectively.

5. Accrued Expenses and Other Current Liabilities

Accrued expenses and other current liabilities consisted of the following:

	December 31,	
(in thousands)	2020	2019
Accrued employee-related and other expenses	$ 2,727	$ 276
Accrued research and development	1,924	308
Accrued professional fees	1,097	45
Accrued license and milestone fees	450	—
Accrued other	62	309
Total accrued expenses	6,260	938

6. Convertible Notes

In October 2016, July 2017 and December 2018, the Company issued convertible notes in the principal amounts of approximately $1.0 million, $1.6 million, and $2.5 million, respectively (collectively, the "Convertible Notes"), to its majority owner at the time, PureTech. The Convertible Notes accrued interest at an annual rate of 10%, and unless converted were due and payable by the Company on the thirtieth day following the demand by PureTech. At the election of the noteholder, upon the occurrence of the closing of a qualified financing, the unpaid balance of the Convertible Notes, plus any accrued interest through the conversion date, would be converted into the securities issued in the qualified financing at a conversion price equal to the lower of (i) 75% of the purchase price per share of such securities issued in the qualified financing and (ii) the price per share determined by dividing $30.0 million by the fully-diluted capitalization of the Company immediately prior to the qualified financing.

The Company determined that the contingent conversion or exchange upon a next round of financing at 75% of the next round's price was an embedded derivative ("Share Settlement Obligation") that required bifurcation as derivative liabilities as well as upon issuance a reduction in the carrying value of the underlying Convertible Notes. The Company estimates the fair value of embedded Share Settlement Obligation derivatives at each issuance date based on the high probability of the triggering events. The Convertible Notes were settled into Series A-2 Preferred Stock under the terms of the bifurcated derivative Share Settlement Obligation. The Convertible Notes and related accrued interest totaled $5.5 million on the date of settlement in February 2019. Non-cash interest expense related to amortization of discounts created by the Share Settlement Obligation derivative values and issuance costs was $0.6 million during the year ended December 31, 2019. The carrying value of the Convertible Notes and derivative liabilities were settled for approximately 18.4 million shares of Series A-2 redeemable convertible preferred stock which was recorded at issuance date fair value. The difference between the carrying amount of the Convertible Notes and the derivative liabilities and the fair value of the preferred stock resulted in an insignificant loss on extinguishment.

Because the conversion price for the Convertible Notes was variable, the Convertible Notes were considered to be share-settled debts and a beneficial conversion feature is not applicable.

7. Redeemable Convertible Preferred Stock

As of December 31, 2020, the authorized capital stock of the Company included 338,973,691 shares of $0.0001 par value preferred stock, of which 20,000,000 shares were designated as Series A-1 redeemable convertible preferred stock ("Series A-1"); 107,194,866 shares were designated as Series A-2 redeemable convertible preferred stock ("Series A-2") and 211,778,825 shares were designated as Series B redeemable convertible preferred stock ("Series B").

Series A-1 and Series A-2 Redeemable Convertible Preferred Stock

On February 12, 2019, the Company entered into the Series A-2 Preferred Stock Purchase Agreement that provided for the issuance and sale of up to 88,750,000 shares of Series A-2 at a purchase price of $0.40 per share in two closings. In conjunction with the Series A-2 closing, convertible notes valued at $5.5 million of principal and accrued interest converted into 18,444,866 shares of Series A-2 (see Note 6).

On February 12, 2019, the Company issued and sold 44,375,000 shares of Series A-2 for total gross cash proceeds of $17.8 million.

Included in the terms of the Series A-2 were tranche rights. The tranche rights obligated the investors in the Series A-2 to purchase, and the Company to sell, an additional 44,375,000 shares of Series A-2 at a purchase price of $0.40 per share upon achieving certain milestones related to the Company's research platform ("Milestone Closing"). The number of shares and issuance price for the Milestone Closing were fixed at inception, and the timing for the closing was dependent on whether the Company met certain research and development milestones or if an earlier closing is voted by the Series A-2 holders. The Series A-2 tranche obligation is an embedded feature that does not net settle and therefore, it did not meet the definition of an embedded derivative.

On February 5, 2020, the Company issued and sold 44,375,000 shares of Series A-2 for total gross cash proceeds of $17.8 million related to the Milestone Closing.

Series B Redeemable Convertible Preferred Stock Closing

On June 29, 2020, the Company issued and sold 124,519,220 shares of its Series B redeemable convertible preferred stock at a per share price of $0.52 ("Original Purchase Price") for total gross proceeds of $64.7 million. The stock purchase agreement provides for a second closing obligating the investors in the Series B redeemable convertible preferred stock to purchase, and the Company to sell, an additional 87,259,605 shares of Series B redeemable convertible preferred stock at a per share price of $0.52 upon the achievement of the second tranche milestone.

The number of shares and issuance price for the second tranche closing are fixed at inception, and the timing for the closing is dependent on whether the Company meets certain research and development milestones. The Series B tranche obligation is an embedded feature that does not net settle and therefore, it did not meet the definition of an embedded derivative. On January 8, 2021, upon achievement of the second tranche milestone, the Company issued and sold 87,259,605 shares of Series B redeemable convertible preferred stock at a price of $0.52 per share, for total gross and net proceeds of $45.4 million

On February 9, 2021, the Company completed its IPO. Upon closing of the IPO, all shares of Series A-1, A-2 and B redeemable convertible preferred stock then outstanding automatically converted into 24,924,501 shares of common shares. Upon conversion of the redeemable convertible preferred stock, the Company reclassified the carrying value of the redeemable convertible preferred stock to common shares and additional paid-in capital.

As of December 31, 2020, redeemable convertible preferred stock consisted of the following:

(in thousands, except share amounts)	Preferred Stock Authorized	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Value	Cumulative Undeclared Dividends	Common Stock Issuable Upon Conversion
Series A-1 redeemable convertible preferred stock	20,000,000	20,000,000	$ 2	$ 4,000	$ —	1,470,588
Series A-2 redeemable convertible preferred stock	107,194,866	107,194,866	42,786	$ 42,878	5,073	7,881,965
Series B redeemable convertible preferred stock	211,778,825	124,519,220	64,548	$ 64,750	2,625	9,155,810
Total	338,973,691	251,714,086	$ 107,336	$ 111,628	$ 7,698	18,508,363

As of December 31, 2019, redeemable convertible preferred stock consisted of the following:

(in thousands, except share amounts)	Preferred Stock Authorized	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Value	Cumulative Undeclared Dividends	Common Stock Issuable Upon Conversion
Series A-1 redeemable convertible preferred stock	20,000,000	20,000,000	$ 2	$ 4,000	$ —	1,470,588
Series A-2 redeemable convertible preferred stock	107,194,866	62,819,866	25,067	25,128	1,773	4,619,103
Total	127,194,866	82,819,866	$ 25,069	$ 29,128	$ 1,773	6,089,691

8. Common Stock

As of December 31, 2020, the Company's authorized capital stock included 420,000,000 shares of its $0.0001 par value common stock.

Each share of common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders provided, however, that, except as otherwise required by law, holders of common stock shall not be entitled to vote on any amendment to the Company's Certificate of Incorporation, as amended (the "Certificate of Incorporation"), that relates solely to the terms of one or more outstanding series of preferred stock if the holders of such affected series are entitled, either separately or together with the holders of one or more other such series, to vote thereon pursuant to the Certificate of Incorporation or pursuant to the Delaware General Corporation Law. Common stockholders are entitled to receive dividends, as may be declared by the Company's board of directors, if any, subject to the preferential dividend rights of the Series A and Series B redeemable convertible preferred stock. No dividends have been declared or paid as of and for either of the years ended December 31, 2020 and 2019.

9. Stock-Based Compensation

2015 Stock Incentive Plan

In December 2015, the Company's board of directors adopted and approved, the 2015 Stock Incentive Plan (the "2015 Plan"). The Company's board of directors has reserved shares of the Company's common stock for issuance under the 2015 Plan to encourage and enable the officers, employees, directors, consultants and other key persons to acquire a proprietary interest in the Company.

The 2015 Plan provides for the granting of incentive stock options, non-statutory stock options, restricted stock awards and other stock-based awards to eligible employees, officers, directors, consultants and advisors as determined by the Company's board of directors. Terms of the restricted stock awards and stock option agreements, including vesting requirements, are determined by the Company's board of directors or compensation committee of the board, subject to the provisions of the 2015 Plan.

In February 2019, the Company's board of directors approved an amendment to the 2015 Plan (the "2019 Plan Amendment"). The 2019 Plan Amendment increased the maximum number of shares reserved for issuance under the 2015 Plan by 1,250,397 shares to a total of 1,526,132 shares. In February 2020 and June 2020, the Company's board of directors approved amendments to the 2015 Plan (collectively the "2020 Plan Amendments"). The 2020 Plan Amendments increased the maximum number of shares reserved for issuance under the 2015 Plan by a total of 3,743,768 shares to a total of 5,269,901 shares. As of December 31, 2020, the total number of shares of the Company's common stock available to be issued under the 2015 Plan, as amended by the 2019 Plan Amendment and the 2020 Plan Amendments, was 66,050 shares.

In October 2020, the Company granted an option to purchase 294,117 shares of its common stock to an advisor outside of the 2015 Plan, with a strike price of $28.29 per share. Such grant was made outside of the 2015 Plan but is subject to the terms and conditions of such plan.

Stock Options

The Company's stock options generally vest over 48 months with 25% vesting after one year followed by ratable monthly vesting over three years and have a contractual term of 10 years. The weighted-average assumptions used principally in determining the fair value of options granted were as follows:

	Year Ended December 31,	
	2020	2019
Fair value of common stock	$ 4.29	$ 1.36
Expected term (in years)	6.0	6.0
Expected volatility	77.3%	76.3%
Risk-free interest rate	0.4%	1.9%
Dividend yield	—	—

The following table summarizes the Company's stock option activity for the year ended December 31, 2020:

	Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding at January 1, 2020	1,236,967	$ 1.11	9.33	$ 1,156
Granted	4,256,106	$ 4.29		
Exercised	(385,138)	$ 0.93		
Forfeited	(23,256)	$ 0.98		
Outstanding at December 31, 2020	5,084,679	$ 3.79	9.42	$ 32,086
Exercisable at December 31, 2020	761,358	$ 1.69	9.04	$ 5,552

The aggregate intrinsic value of options is calculated as the difference between the exercise price of the stock options and the fair value of the Company's common stock for those stock options that had exercise prices lower than the fair value of the common stock as of the end of the period.

The weighted-average grant-date fair value of stock options granted during the years ended December 31, 2020 and 2019 was $2.19 and $0.92 per share, respectively. As of December 31, 2020, total unrecognized compensation expense related to stock options was $8.8 million which is expected to be recognized over a weighted-average period of 3.34 years.

During the year ended December 31, 2020, options for 159,197 shares with a weighted-average exercise price of $2.59 and a weighted-average grant date fair value of $1.90 were exercised but unvested at the time of exercise. As of December 31, 2020, options for 388,157 shares with a weighted average exercise price of $1.86 were exercised and unvested. The underlying proceeds from the unvested exercises of $0.7 million is recorded in other current liabilities on the consolidated balance sheet.

Stock-Based Compensation

Stock-based compensation expense was allocated as follows:

	Year Ended December 31,	
(in thousands)	2020	2019
Research and development	$ 665	$ 105
General and administrative	677	67
Total stock-based compensation expense	$ 1,342	$ 172

10. Leases

During 2019, the Company operated out of leased office and lab space at two different locations in Cambridge, Massachusetts. Both of these leases were determined to be short-term operating leases under ASC 842 and expired at various times during the year ended December 31, 2020.

Cambridgepark Lease

In December 2019, the Company entered into a lease agreement for its new corporate office and laboratory facility (the "Cambridgepark Lease") in Cambridge, Massachusetts. The Cambridgepark Lease has a term of 10 years, beginning on the rent commencement date which is two months after the lease commencement date. There are no options to extend the lease. The lease commencement date, for accounting purposes, was deemed to be reached as of June 30, 2020 and therefore the lease is included as an operating lease right-of-use asset and operating lease liability as of December 31, 2020.

The Cambridgepark Lease contains scheduled rent increases over the lease term. The Cambridgepark Lease also required the Company to deliver an irrevocable standby letter of credit in an amount of $1.6 million to the landlord as security for the Company's performance and observance of the terms, conditions and covenants of the lease for the period commencing on the effective date of the Cambridgepark Lease. This letter of credit will increase to $1.9 million when certain conditions are met by the landlord and may decrease under certain conditions after the third anniversary of the rent commencement date.

Vivarium Lease

In March 2020, the Company entered into a lease agreement for vivarium space (the "Vivarium Lease") in Cambridge, Massachusetts and began occupying the space in April 2020 with annual rent payments of $0.2 million. The Vivarium Lease has a lease term for accounting purposes of two years. The lease commencement date was reached as of June 30, 2020 and therefore the lease is included as an operating lease right-of-use asset and operating lease liability as of December 31, 2020.

On the lease commencement date, the Company identified and assessed the following significant assumptions in recognizing its right-of-use assets and corresponding lease liabilities:

- As the Cambridgepark and Vivarium Leases did not provide an implicit rate, the Company estimated the incremental borrowing rate in calculating the present value of the lease payments based on the respective lease term.
- Since the Company elected to account for each lease component and its associated non-lease components as a single combined component, all contract consideration was allocated to the combined lease component; and
- The expected lease terms included all noncancelable lease periods.

The elements of lease expense were as follows:

(in thousands)	Year Ended December 31, 2020	Year Ended December 31, 2019
Operating lease cost	$ 1,780	$ —
Short-term lease cost	309	305
Variable lease cost	235	111
Total lease cost	$ 2,324	$ 416
Other Information		
Cash paid for amounts included in the measurement of lease liabilities		
Operating cash flows for operating leases	$ 703	$ —
Right-of-use assets obtained in exchange for lease obligations	17,899	—
Weighted-average remaining lease term	9.55	—
Weighted-average discount rate	9.36%	—

Right-of-use lease assets and lease liabilities are reported in the Company's consolidated balance sheets as follows:

(in thousands)	December 31, 2020
Assets	
Operating right-of-use assets	$ 17,117
Liabilities	
Operating lease liabilities, current	$ 863
Operating lease liabilities, non-current	17,430
Total lease liabilities	$ 18,293

Maturities of lease liabilities due under the Company's Cambridge park lease and Vivarium lease as of December 31, 2020 were as follows:

(in thousands)	Year Ending December 31,
2021	$ 2,530
2022	2,692
2023	2,718
2024	2,799
2025	2,883
Thereafter	14,635
Total lease payments	$ 28,257
Less: imputed interest	(9,964)
Present value of lease liabilities	$ 18,293

11. Significant Agreements

The Company has agreements with third parties in the normal course of business under which it has obtained licenses for certain developed technologies.

Columbia License Agreement

In April 2016 (and amended in February 2019), the Company entered into an exclusive license agreement (the "Columbia Agreement") with The Trustees of Columbia University in the City of New York ("Columbia"). Under the Columbia Agreement, the Company has exclusively licensed the worldwide rights to key patents, technical information, and use of materials from Columbia.

The Company is required to pay Columbia an annual license fee in the low five digits. The Company is also obligated to make milestone payments to Columbia of up to an aggregate of $0.2 million upon the achievement of certain clinical milestones and milestone payments to Columbia of up to an aggregate of $4.45 million for certain regulatory and commercial milestones for the first two products. In addition, the Company is required to pay Columbia escalating low single digits royalties on cumulative annual net sales of licensed products. As of December 31, 2020, the Company was obligated to pay $0.1 million in milestone payments and this amount is included within accrued expenses balance on the consolidated balance sheet.

National Institutes of Health License Agreement

In October 2020, the Company entered into a patent license agreement (the "Patent License") with the U.S. Department of Health and Human Services, as represented by National Cancer Institute ("NCI") of the National Institutes of Health. Pursuant to the terms of the Patent License, the Company is required to pay NCI a license issue

fee in the aggregate amount of $0.4 million of which this amount is included within accrued expenses balance on the consolidated balance sheet as of December 31, 2020. The terms of the Patent License also require the Company to pay NCI de minimis minimum annual royalties, which royalties are creditable against earned royalties on sales of licensed products or licensed processes. The Company must also pay NCI tiered royalties on net sales of licensed products at rates in the low single digits. The Company is also required to pay NCI one-time milestone payments upon successful completion of specified clinical and regulatory milestones relating to the licensed products. The aggregate potential milestone payments are $8.0 million. In addition, the Company is required to pay NCI one-time milestone payments following aggregate net sales of licensed products at certain net sales up to $2.0 billion. The aggregate potential amount of these milestone payments is $6.0 million. To the extent the Company enters into a sublicensing agreement relating to a licensed product, the Company is required to pay NCI a percentage of the non-royalty based consideration received from a sublicensee, with specified exclusions, which percentage ranges from the low single digits to low double digits. The Company is also required to reimburse NCI for its past patent expenses for the licensed patent rights, as well as the Company's pro rata share of future patent expenses, in each case, in connection with NCI's prosecution or maintenance of the licensed patent rights.

12. Commitments and Contingencies

Legal Proceedings

The Company is not currently a party to any material legal proceedings. At each reporting date, the Company evaluates whether or not a potential loss amount or potential range of loss is probable and reasonably estimated under the provisions of the authoritative guidance that addresses accounting for contingencies. The Company recognizes expenses for its costs related to its legal proceedings, as incurred.

13. Defined Contribution Benefit Plan

The Company maintains a defined contribution plan under Section 401(k) (the "401(k) Plan") of the Internal Revenue Code, as amended (the "Code"). The 401(k) Plan covers all employees who meet defined minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pretax basis, as well as Roth post tax deferrals. The 401(k) Plan does not currently provide for matching contributions.

14. Related Party Transactions

The Company had an agreement with one of its shareholders, PureTech, where it shared certain costs and obtained consulting and management services during the year ended December 31, 2019. Additionally, PureTech had paid certain Company expenses directly on behalf of the Company. The Company incurred expenses of approximately $0.9 million related to such services during the year ended December 31, 2019. This agreement was terminated in 2019 and no amounts were owed to PureTech at either December 31, 2020 or 2019.

15. Income Taxes

The Company accounts for income taxes under FASB ASC 740 ("ASC 740"). For the years ended December 31, 2020 and 2019, the Company did not record a current or deferred income tax expense or benefit. The following table reconciles the federal statutory income rate to the Company's effective income tax rate:

	Year Ended December 31,	
	2020	2019
Federal income tax rate	21.0%	21.0%
State income tax benefit	6.0%	5.6%
Permanent items	—	(2.3)%
Research tax credits	5.8%	1.5%
Other	(0.2)%	—
Valuation allowance	(32.6)%	(25.8)%
Effective income tax rate	0.0%	0.0%

Deferred tax assets and liabilities reflect the net tax effects of net operating loss and tax credit carryforwards and temporary differences between the carrying amount of assets and liabilities for financial reporting and the amounts used for tax purposes. Significant components of the Company's deferred tax assets and liabilities were as follows:

(in thousands)	Year Ended December 31, 2020	2019
Deferred tax asset:		
Accrued expenses	$ 659	$ 256
Federal net operating loss carryforwards	11,515	3,000
State net operating loss carryforwards	3,113	743
Tax credits	2,851	350
Stock compensation	177	85
Lease liability	4,941	—
Total deferred tax assets	23,256	4,434
Valuation allowance	(18,414)	(4,300)
Net total deferred tax assets	$ 4,842	$ 134
Deferred tax liabilities:		
Lease right of use asset	(4,624)	—
Depreciation and amortization	(218)	(134)
Total deferred tax liabilities	$ (4,842)	$ (134)
Net deferred tax assets	$ —	$ —

The Company has weighed the positive and negative evidence to assess the recoverability of its deferred tax assets. Realization of future tax benefits is dependent on many factors, including the Company's ability to generate taxable income. After this assessment, the Company determined it was more likely than not that the Company will not realize the benefit of its deferred tax assets. As a result, the Company has provided a full valuation allowance against its net deferred tax assets. The valuation allowance for deferred tax assets as of December 31, 2020 and 2019 was $18.4 million and $4.3 million, respectively. For the years ended December 31, 2020 and 2019, the Company recorded an increase in the valuation allowance of $14.1 million and $2.8 million, respectively, primarily related to net operating losses and tax credits.

As of December 31, 2020, the Company had gross U.S. federal net operating loss carryforwards of $54.8 million including $52.9 million that had an indefinite carryforward period and $1.9 million that were subject to expiration at various dates through 2037. As of December 31, 2020, the Company had state net operating loss carryforwards of $49.3 million which will expire at various dates through 2040. As of December 31, 2020, the Company had U.S. research and development tax credit carryforwards of $1.8 million which will expire at various dates through 2040 and state research and credit carryforwards of $1.3 million which will expire at various dates through 2035. The net operating loss and tax credit carryforwards are subject to review and possible adjustment by the Internal Revenue Service and state tax authorities.

Net operating loss and tax credit carryforwards may become subject to an annual limitation in the event of certain cumulative changes in the ownership interest of significant shareholders over a three-year period in excess of 50%, as defined under Sections 382 and 383 of the Code, respectively, as well as similar state provisions. This could limit the amount of tax attributes that can be utilized annually to offset future taxable income or tax liabilities. The amount of the annual limitation is determined based on the value of the Company immediately prior to the ownership change. Subsequent ownership changes may further affect the limitation in future years. The Company has not determined whether an ownership change has occurred and as such, the Company's net operating losses may be limited. Any limitation may result in expiration of a portion of the net operating loss carryforwards or research development credit carryforwards before utilization.

The Company has not, as yet, conducted a study of research and development credit carryforwards. Such a study, once undertaken by the Company, may result in an adjustment to the research and development credit carryforwards. However, a full valuation allowance has been provided against the Company's research and development credits and, if any adjustment is required, such adjustment would be offset by an adjustment to the valuation allowance. Thus, there would be no impact to the balance sheet or statement of operations if any adjustment is required.

As of December 31, 2020 and 2019, the Company did not have any unrecognized tax benefits. Any future interest and penalties related to income tax matters would be recognized in the provision for income tax. As of December 31, 2020 and 2019, the Company did not have a balance of accrued interest and penalties related to uncertain tax positions.

In March 2020, the Coronavirus Aid, Relief, and Economic Security Act (the "CARES Act") was signed into law. The CARES Act includes provisions relating to several aspects of corporate income taxes. The CARES Act did not have a significant impact on the Company's provision for income taxes.

The Company files income tax returns in the United States and various states. As of December 31, 2020, there were no income tax examinations in progress.

The tax years 2017 through present remain open to examination by major taxing jurisdictions to which the Company is subject, which are primarily in the United States. In addition, tax year 2015 resulted in losses and the Company also generated research and development tax credits during that year. Since carryforward attributes generated in this year may be utilized in future years, 2015 may still be adjusted upon examination by the Internal Revenue Service or state tax authorities if they have or will be used in a future period.

16. Net Loss Per Share

The following table sets forth the computation of the Company's basic and diluted net loss per share for the years ended December 31, 2020 and 2019:

	Year Ended December 31,	
(in thousands, except share and per share amounts)	**2020**	**2019**
Numerator:		
Net loss	$ (43,337)	$ (10,839)
Cumulative dividends on redeemable convertible preferred stock	(5,925)	(1,773)
Net loss attributable to common stockholders	$ (49,262)	$ (12,612)
Denominator:		
Weighted-average number of common shares outstanding, basic and diluted	213,658	114,961
Net loss per share attributable to common stockholders, basic and diluted	$ (230.57)	$ (109.70)

As of December 31, 2020 and 2019, the Company's potentially dilutive securities were redeemable convertible preferred stock and stock options. Based on the amounts outstanding at December 31, 2020 and 2019, the Company excluded the following potential common shares from the computation of diluted net loss per share attributable to common stockholders because including them would have had an anti-dilutive effect:

	Year Ended December 31,	
	2020	**2019**
Series A-1 redeemable convertible preferred stock	1,470,588	1,470,588
Series A-2 redeemable convertible preferred stock	7,881,965	4,619,103
Series B redeemable convertible preferred stock	9,155,810	—
Options to purchase common stock	5,084,679	1,236,967

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Registration Statement (Form S-8 No. 333-252908) pertaining to the 2015 Stock Incentive Plan, the 2021 Equity Incentive Plan, the 2021 Employee Stock Purchase Plan, and the Stock Option Awarded Outside Any Plan of Vor Biopharma Inc. of our report dated March 25, 2021, with respect to the consolidated financial statements of Vor Biopharma Inc. included in this Annual Report (Form 10-K) for the year ended December 31, 2020.

/s/ Ernst & Young LLP

Boston, Massachusetts
March 25, 2021

Exhibit 31.1

CERTIFICATIONS

I, Robert Ang, certify that:

1. I have reviewed this Annual Report on Form 10-K of Vor Biopharma Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 25, 2021

By: /s/ Robert Ang
Robert Ang
President and Chief Executive Officer
(*Principal Executive Officer*)

Exhibit 31.2

CERTIFICATIONS

I, Nathan Jorgensen, certify that:

1. I have reviewed this Annual Report on Form 10-K of Vor Biopharma Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 25, 2021

By: /s/ Nathan Jorgensen
Nathan Jorgensen
Chief Financial Officer
(*Principal Financial Officer*)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of Vor Biopharma Inc. (the "Company") for the year ended December 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers of the Company hereby certifies, pursuant to 18 U.S.C. § 1350, that to his knowledge:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

Date: March 25, 2021

By: /s/ Robert Ang
Robert Ang
President and Chief Executive Officer
(*Principal Executive Officer*)

Date: March 25, 2021

By: /s/ Nathan Jorgensen
Nathan Jorgensen
Chief Financial Officer
(*Principal Financial Officer*)