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, 2023

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 001-39941

Sana Biotechnology, Inc.

(Exact name of Registrant as specified in its Charter)

Delaware	**83-1381173**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
188 East Blaine Street , Suite 400	
Seattle , Washington	**98102**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (206) 701-7914

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	SANA	The Nasdaq Stock Market LLC

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. ☐

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the Registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the Registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant was approximately $

0.6

billion, based on the closing price of the Registrant's common stock on the Nasdaq Global Select Market on June 30, 2023, the last business day of the Registrant's most recently completed second fiscal quarter. Shares of the Registrant's common stock held by each officer and director and stockholders that the Registrant has concluded are affiliates of the Registrant have been excluded in that such persons may be deemed affiliates of the Registrant. This determination of affiliate status is not a determination for other purposes.

As of February 22, 2024, the Registrant had

220,447,557

shares of common stock, $0.0001 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant's definitive Proxy Statement relating to its 2024 Annual Meeting of Stockholders (Proxy Statement) are incorporated by reference into Part III of this Annual Report on Form 10-K (Annual Report) where indicated. The Proxy Statement will be filed with the U.S. Securities and Exchange Commission within 120 days after the end of the fiscal year to which this Annual Report relates.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K (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 could be deemed forward-looking statements, including those statements highlighted below. In some cases, you can identify these statements by forward-looking words such as “aim,” “anticipate,” “believe,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “might,” “plan,” “potential,” “predict,” “should,” “would,” or “will,” the negative of these terms, and other comparable terminology. These forward-looking statements, which are subject to risks, include, but are not limited to, statements about:

- our expectations regarding the potential market size and size of the potential patient populations for our product candidates and any future product candidates, if approved for commercial use;
- our clinical and regulatory development plans;
- our expectations with regard to our preclinical studies, clinical trials, and research and development programs, including the impact, timing, and availability of data from such studies and trials;
- the timing of commencement and advancement of future preclinical studies, clinical trials, and research and development programs;
- our ability to acquire, discover, and develop product candidates and timely advance them into and through clinical data readouts and successful completion of clinical trials;
- our expectations regarding the potential safety, efficacy, or clinical utility of our product candidates;
- our intentions with respect to and our ability to establish collaborations or partnerships;
- the timing or likelihood of regulatory filings and approvals for our product candidates;
- our commercialization, marketing, and manufacturing expectations, including with respect to the buildout of our manufacturing facility and capabilities and the timing thereof;
- impact of future regulatory, judicial, and legislative changes or developments in the United States and foreign countries;
- our intentions with respect to the commercialization of our product candidates;
- the pricing and reimbursement of our product candidates, if approved;
- the potential effects of public health crises on our preclinical and clinical programs and business;
- our expectations regarding the impact of global events and macroeconomic conditions on our business;
- the implementation of our business model and strategic plans for our business and product candidates, including additional indications that we may pursue;
- our ability to effectively manage our growth, including our ability to retain and recruit personnel, and maintain our culture;
- the scope of protection we are able to establish and maintain for intellectual property rights covering our product candidates, including the projected terms of patent protection;
- estimates of our expenses, future revenue, capital requirements, needs for additional financing, and ability to obtain additional capital;
- our expected use of proceeds from our initial public offering and our existing cash, cash equivalents, and marketable securities;
- the performance of our third-party suppliers and manufacturers;
- our future financial performance;
- our expectations regarding the duration for which we will be an emerging growth company under the Jumpstart Our Business Startups Act of 2012 (JOBS Act); and
- developments and projections relating to our competitors and our industry, including competing products.

We have based these forward-looking statements largely on our current expectations, estimates, forecasts, and projections about future events, our business, the industry in which we operate, and financial trends that we believe may affect our financial condition, results of operations, business strategy, and financial needs. In light of the significant uncertainties in these forward-looking statements, you should not rely upon forward-looking statements as predictions of future events. Although we believe that we have a reasonable basis for each forward-looking statement contained in this Annual Report, we cannot guarantee that the future results, levels of activity, performance, or events and circumstances reflected in the forward-looking statements will be achieved or occur in a timely manner or at all. You should refer to the sections titled “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” for a discussion of important factors that may cause our actual results to differ materially from those expressed or implied by our forward-looking statements. Other sections of this Annual Report may include additional factors that could harm our business and financial performance. New risk factors may emerge from time to time, and it is not possible for our management to predict all risk factors, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in, or implied by, any forward-looking statements. Except as required by law, we undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events, or otherwise.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this Annual Report, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and you should not unduly rely upon these statements.

RISK FACTOR SUMMARY

Investing in our securities involves a high degree of risk. Below is a summary of material factors that make an investment in our securities speculative or risky. Importantly, this summary does not address all of the risks that we face. Additional discussion of the risks summarized in this Risk Factor Summary, as well as other risks that we face, can be found under the heading "Risk Factors" in Part I of this Annual Report.

Our business is subject to a number of risks of which you should be aware before making a decision to invest in our common stock. These risks include, among others, the following:

- Our *ex vivo* and *in vivo* cell engineering platforms are based on novel technologies that are unproven and may not result in approvable or marketable products. This uncertainty exposes us to unforeseen risks, makes it difficult for us to predict the time and cost that will be required for the development and potential regulatory approval of our product candidates, and increases the risk that we may ultimately not be successful in our efforts to use and expand our technology platforms to build a pipeline of product candidates.
- If we are unable to successfully identify, develop, and commercialize any product candidates, or experience significant delays in doing so, our business, financial condition, and results of operations will be materially adversely affected.
- We will require additional funding to finance our operations. If we are unable to raise capital when needed, or on acceptable terms, we could be forced to delay, reduce, or eliminate our product development programs or commercialization efforts.
- We may not realize the benefits of technologies that we have acquired or in-licensed or will acquire or in-license in the future. We may also fail to enter into new strategic relationships or may not realize the benefits of any strategic relationships that we have entered into. The occurrence of any of the foregoing could materially adversely affect our business, financial condition, commercialization prospects, and results of operations.
- Our ability to develop our cell engineering platforms and product candidates and our future growth depend on retaining our key personnel and recruiting additional qualified personnel.
- We may encounter difficulties in managing our growth if and as we expand our operations, including our development and regulatory capabilities, which could disrupt our operations and otherwise harm our business.
- The use of human stem cells exposes us to a number of risks in the development of our human stem cell-derived products, including inability to obtain suitable donor material from eligible and qualified human donors, restrictions on the use of human stem cells, as well as ethical, legal, and social implications of research on the use of stem cells, any of which could prevent us from completing the development of or commercializing and gaining acceptance for our products derived from human stem cells.
- We must successfully progress our product candidates through extensive preclinical studies and clinical trials in order to obtain regulatory approval to market and sell such product candidates. Even if we obtain positive results in preclinical studies of a product candidate, these results may not be predictive of the results of future preclinical studies or clinical trials.
- Preclinical testing of our product candidates may be delayed or otherwise unsuccessful, which would harm our ability to commence and successfully complete clinical trials of, and ultimately commercialize, such product candidates.
- Clinical drug development is a lengthy and expensive process with uncertain timelines and outcomes. If clinical trials of any of our product candidates are prolonged or delayed, or need to be terminated, we may be unable to obtain required regulatory approvals and commercialize such product candidates on a timely basis or at all.
- Clinical trials may fail to demonstrate that our product candidates, including any future product candidates, or technologies used in or used to develop such product candidates, meet the FDA's or a comparable foreign regulatory authority's requirements with respect to safety, purity, and potency, or efficacy, which would prevent, delay, or limit the scope of regulatory approval and commercialization of such product candidates.
- Our product candidates may cause serious adverse, undesirable, or unacceptable side effects or have other properties that may delay or prevent marketing approval. If a product candidate receives regulatory approval, and such side effects are identified following such approval, the commercial profile of any approved label may be limited, or we may be subject to other significant negative consequences following such approval.
- The manufacture of our product candidates is complex. We or our contract development and manufacturing organizations (CDMOs) may encounter difficulties in production, which could delay or entirely halt our or their ability to supply our product candidates for clinical trials or, if approved, for commercial sale.

• We are exposed to a number of risks related to the supply chain for the materials required to manufacture our product candidates.

• We rely, and expect to continue to rely, on third parties to perform certain activities, including research and preclinical studies, manufacture of our product candidates and materials used in the manufacturing of our product candidates, and the conduct of various aspects of our clinical trials. Any failure of such third parties to perform their obligations to us, including in accordance with our timelines or applicable regulatory requirements, could materially harm our business.

• Our success depends on our ability to protect our intellectual property rights and proprietary technologies, and we may not be able to protect our intellectual property rights throughout the world.

• We depend on intellectual property licensed from third parties. If we breach our obligations under the applicable license agreements or if any of these agreements is terminated, we may be required to pay damages, lose our rights to such intellectual property and technology, or both, which would harm our business.

• Our internal computer systems, or those used by third parties involved in our operations, such as research institution collaborators, clinical research organizations (CROs), CDMOs, and other service providers, contractors, or consultants, may fail or suffer security breaches or incidents.

• The development and commercialization of biopharmaceutical products is subject to extensive regulation, and the regulatory approval processes of the United States Food and Drug Administration (FDA) and comparable foreign regulatory authorities are lengthy, time-consuming, and inherently unpredictable. If we are unable to obtain regulatory approval for our product candidates on a timely basis, or at all, our business will be substantially harmed.

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

• Our success payment and contingent consideration obligations in our license and acquisition agreements may result in dilution to our stockholders, drain our cash resources, or require us to incur debt to satisfy the payment obligations.

• We operate in highly competitive and rapidly changing industries, which may result in others discovering, developing, or commercializing competing products before or more successfully than we do.

• Our limited operating history may make it difficult to evaluate our prospects and likelihood of success.

• We or the third parties upon whom we depend may be adversely affected by natural disasters, public health epidemics, telecommunications or electrical failures, geo-political actions, including war and terrorism, political and economic instability, and other events beyond our control, and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

• Market and economic conditions may negatively impact our business, financial condition, and share price.

PART I

Item 1. Business.

Overview

We were founded on the belief that engineered cells will be one of the most important transformations in medicine over the next several decades. The burden of diseases that can be addressed at their root cause through engineered cells is significant. We view engineered cells as having the potential to be as therapeutically disruptive as biologic drugs to clinical practice. Key to making this vision a reality will be finding consistent and scalable means of manufacturing cell-based medicines, and we have invested significantly in our hypoimmune (HIP) platform technology, which we refer to as our HIP platform, with the twin goals of using allogeneic cells that evade immune detection in patients and that we can manufacture at scale. We are developing cell engineering programs to revolutionize treatment across a broad array of therapeutic areas with unmet treatment needs, including oncology, diabetes, B-cell-mediated autoimmune, and central nervous system (CNS) disorders, among others.

We currently have four clinical trials that are ongoing, or that we expect to commence in the near-term, evaluating our product candidates, or product candidates developed using our technologies, across seven diseases in multiple therapeutic areas, including B-cell malignancies, B-cell-mediated autoimmune disease, and type 1 diabetes (T1D), as described below.

- **ARDENT** is an ongoing Phase 1 clinical trial evaluating SC291, our hypoimmune-modified CD19 targeted allogeneic chimeric antigen receptor (CAR) T program, in B-cell malignancies, including non-Hodgkin's lymphoma (NHL) and chronic lymphoblastic leukemia (CLL**)**;
- **GLEAM** is a Phase 1 clinical trial evaluating SC291 in patients with lupus nephritis (LN), extrarenal lupus (ERL), and antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis;
- **VIVID** is a Phase 1 clinical trial evaluating SC262, our hypoimmune-modified CD22 CAR T program, in patients with relapsed and/or refractory B-cell malignancies who have received prior CD19 CAR T therapy; and
- Investigator-sponsored first-in-human study (IST) evaluating UP421, an allogeneic, primary islet cell therapy engineered with our HIP technology, in patients with type 1 diabetes mellitus.

In January 2024, we disclosed initial interim clinical data from the ARDENT trial. As of January 5, 2024, the cut-off date for our early interim analysis, six patients had been dosed with SC291 and four patients were evaluable (defined as patients dosed with SC291 who had at least one disease assessment), of whom three were dosed with 60M CAR T cells (Dose Level 1) and the other was dosed with 120M CAR T cells (Dose Level 2). With respect to the four evaluable patients at these two dose levels, we observed no dose limiting toxicities, no SC291-related serious adverse events, and no incidences of graft versus host disease (GvHD). We also observed no cytokine release syndrome (CRS) or immune effector cell-associated neurotoxicity syndrome (ICANS) of any grade or any infections of Grade 3 or higher. Additionally, we observed at least a partial response in three of the patients, including ongoing complete responses in one patient from Dose Level 1 after three months and the patient from Dose Level 2 after two months.

The SC291 drug product contains CAR T cells that are fully edited hypoimmune cells, which we describe as HIP-edited CAR-T cells, along with partially edited cells, which we describe as non-HIP CAR T cells. In vitro testing showed evidence that blood and immune cells from each of the four evaluable patients had mounted an immune response to the non-HIP CAR T cells but not to the HIP-edited CAR T cells. Specifically, HIP-edited CAR T cells from the drug product were not rejected by the innate immune response mediated by the patient's natural killer (NK) cells, nor did the patients have T cell or antibody responses that recognized these cells. In contrast, we observed immune responses against the non-HIP CAR T cells in the drug product.

Importantly, this evidence suggests that the patients had an intact immune system capable of recognizing allogeneic cells and that the HIP CAR T cells were able to evade these responses. These results were consistent across all four evaluable patients and provide early support for the idea that the immune evasion profile of our HIP gene edits in multiple pre-clinical models may translate into human subjects. We believe this observation supports further dose escalation and dose expansion in the ARDENT trial and broader application of our HIP technology in allogeneic cell therapies in other indications. We are continuing to enroll and dose patients in the ARDENT trial and expect to share additional data in 2024.

We seek to overcome several existing limitations of gene and cell therapy through our *ex vivo* and *in vivo* cell engineering platforms, both of which may facilitate the development of therapies that can transform the lives of patients by repairing cells in the body when possible and replacing them when needed. For *ex vivo* therapies, when diseased cells are damaged or missing entirely and an effective therapy needs to replace the entire cell, a successful therapeutic requires large-scale manufacturing of cells that engraft, function, and persist in the body. Of these, we view cell persistence as the greatest current limitation to dramatically expanding the impact of this class of therapeutics, and in particular, overcoming the barrier of immune rejection of transplanted allogeneic cells. We believe that product candidates developed with our *ex vivo* cell engineering platform, which uses hypoimmune-modified allogeneic cells that can "hide" from the patient's immune system, can address this fundamental limitation and unlock a wave of disruptive therapeutics. For *in vivo* therapies that aim to repair and control genes in the body, a successful product candidate requires both gene modification and *in vivo* delivery of the therapeutic payload. Of these, we view effective *in vivo* delivery as the greatest current limitation to dramatically expanding the impact of this class of therapeutics. To this end, our initial focus is on cell-specific delivery of genetic payloads.

Based upon early clinical as well as extensive preclinical data from our HIP platform, we announced in October 2023 our decision to increase our focus on our *ex vivo* cell therapy product candidates. We expect to focus a meaningful portion of our research and development resources and activities for at least the next several years on advancing HIP-modified *ex vivo* manufactured cells as therapeutics.

Our people are the most important strength of the company. We have assembled a diverse group of experienced company builders, scientists, manufacturing scientists, engineers, and operators to execute our business plan.

- **Experienced Company Builders**. We have numerous individuals with vast experience in building disruptive biotech companies. Our Founder and Chief Executive Officer, Dr. Steve Harr, was previously CFO of Juno Therapeutics, helping to build the company and its CAR T cell therapy platform until its acquisition. He is a physician-scientist with experience in basic research, clinical medicine, finance, company building, and operations. Our Chairman of the Board and co-founder, Mr. Hans Bishop, is an experienced company builder and operator with success across a number of companies.

- **Leading Scientists**. We believe that in order to successfully develop engineered cells as medicines, significant investments in infrastructure and cross-functional capabilities need to be coupled with deep scientific expertise in the cell types of interest within each program. Our leadership team includes multiple world-class scientists, including researchers who have made seminal discoveries in gene delivery, immunology, CAR T cells, stem cell biology, and gene editing. We expect to continue to bring in senior world-class scientists to lead our efforts in each therapeutic area we intend to pursue. Additionally, our research teams have significant experience in various areas of biology. We have surrounded this team of discovery scientists with drug developers experienced in advancing product candidates through the development process with expertise in areas such as pharmacology, toxicology, regulatory, clinical development, and clinical operations.

- **Experienced Manufacturing Scientists, Engineers, and Operators**. Since our founding, we have proactively assembled manufacturing sciences and operations expertise on our board, on our executive team, and across the company.

- **Board and Investors with Shared Long-Term Vision**. Our board of directors is composed of renowned company builders, scientists, drug developers, and investors who share our long-term vision of advancing engineered cells as medicines to change the lives of patients. Our board of directors is a resource that has enabled our strategy of consolidating technologies, assets, and people to expand the potential impact of our long-term vision.

Our capabilities enable us to take a comprehensive approach to the most important and difficult aspects of engineering cells. We are primarily pursuing *ex vivo* cell engineering and can leverage the synergistic proficiencies required to succeed in both approaches. We believe we can capitalize on the shared expertise and infrastructure between the platforms to maximize the potential success and the reach of each of our potentially transformative therapies. We have built deep internal capabilities across a wide range of areas focused on solving the most critical limitations in engineering cells including:

- **Stem Cell and Disease Biology**. Developing our platforms into therapies for patients requires a deep understanding of both cell and disease biology. Furthermore, we are investing significantly in our people and the technologies that enable the differentiation of pluripotent stem cells (PSC) into mature cells that can be used as therapeutics.

- **Immunology**. The immune system can be harnessed to treat multiple diseases, and it can also limit the therapeutic effect of many cell- and gene-based therapies. Understanding and harnessing the immune system can have a broad impact across our *ex vivo* and *in vivo* cell engineering portfolio. We are investing in our people and technologies to harness the immune system, particularly T cells, for the treatment of cancer and other diseases. Additionally, our hypoimmune technology has the potential to "hide" cells from the immune system, unlocking the potential of allogeneic *ex vivo* therapies for the treatment of numerous diseases.

- **Genome Modification**. The ability to knock-out, knock-in, modify, disrupt, and control expression of genes is fundamental to the success of our platforms. We believe our capabilities across multiple modalities will allow us to use the appropriate system for the biologic problem of interest.

- **Gene Delivery**. We believe our delivery technologies have broad potential, with both near-term and long-term applications across a number of indications. We are investing in technologies that allow payload delivery to specific cell types and increase the diversity of payloads.

Our Cell Engineering Platforms

The advent of recombinant DNA technology in the 1970s ushered in a new era of therapeutics, enabling the synthetic manufacture of human protein therapies at scale for the first time. A critical inflection point occurred when key technological advancements eventually enabled the broad development of protein drugs, including monoclonal antibodies with suitable therapeutic properties. These advancements, combined with progress in understanding disease biology, allowed biologics to become the second largest therapeutic class. We believe engineered cells are at a similar inflection point, with key recent technological advancements providing the potential for the broad applicability of this therapeutic class.

Engineering cells *ex vivo* requires the ability to engineer and manufacture cells at scale and then deliver them to the patient so that they engraft, function appropriately, and have the necessary persistence in the body. Our goal for *ex vivo* cell engineering is to replace or add any cell in the body such that those cells engraft, function, and persist over time, and to manufacture those cells cost-effectively at scale. Our *ex vivo* cell engineering platform uses our hypoimmune technology to create cells that can “hide” from the patient’s immune system to enable persistence of allogeneic cells. We are primarily focused on making therapies using PSCs with our hypoimmune genetic modifications as the starting material, which we then differentiate into a specific cell type, such as a pancreatic islet cell, before treating the patient. Additionally, there are cell types for which effective differentiation protocols from a stem cell have not yet been developed, such as T cells. For such cell types, instead of starting from a PSC, we can use a fully differentiated allogeneic cell, sourced from a donor, as the starting material to which we then apply our hypoimmune genetic modifications. Our goal is to manufacture genetically modified cells that are capable of both replacing the missing cell and evading the patient’s immune system. We are now applying our *ex vivo* cell engineering technologies to make cell products for the treatment of multiple diseases. We anticipate sharing data in 2024 from multiple clinical trials exploring these therapeutics in various diseases.

Our Portfolio Strategy

We believe the potential applications of our platforms are vast. To prioritize programs for our *ex vivo* and *in vivo* engineering pipeline, we have used the following strategies:

- minimize biology risk where there is platform risk, or in other words, prioritize opportunities where success with our platform should lead to success in addressing the underlying disease;

- prioritize program investments in diseases where the strengths of our *ex vivo* and *in vivo* cell engineering platforms can address the key limitations of existing therapeutic approaches;

- focus on conditions of high unmet need, including the most grievous diseases; and

- prioritize efforts where success in one area begets success in others.

Our Pipeline

We are developing a broad pipeline of clinical product candidates focused on creating transformative *ex vivo* therapies across a range of therapeutic areas. We are in the early stages of development across a broad pipeline of product candidates, which are summarized below:

[1]Investigator sponsored trial.
Abbreviations: AAV, ANCA-associated vasculitis; CLL, chronic lymphocytic leukemia; ERL, extrarenal systemic lupus erythematosus; HD, Huntington's disease; LN, lupus nephritis; MM, multiple myeloma; NHL, non-Hodgkin lymphoma; PMD, Pelizaeus-Merzbacher Disease; SPMS, secondary progressive multiple sclerosis; T1D, type 1 diabetes; WW, worldwide.

Each of our initial programs provides the potential for meaningful standalone value while also supporting our potential ability to further exploit our platforms in a manner that leads to the development of broadly applicable medicines.

Allogeneic T Cell Platform

SC291

We are first applying our hypoimmune technology to donor derived T cells to be used as allogeneic cell therapies for hematologic malignancies.

These programs are designed to address a major limitation of existing allogeneic CAR T cell therapies: the need to evade host versus graft responses (HvGR) that occur when a patient's immune system kills the transplanted T cells, limiting the potential benefit of the therapy. The rapid killing of the transplanted cell may be a major contributor to the short-lived responses seen in patients treated with allogeneic CAR Ts. One approach to avoid HvGR has been to effectively eliminate a patient's immune system for a short period using chemotherapy, which puts the patient at risk for severe infections. Further, the patient's suppressed immune system inevitably recovers and eliminates the CAR T cells, limiting the effectiveness of the therapy. Our hypoimmune technology is designed to enable cells to "hide" from the patient's immune system, giving our allogeneic CAR T cell program the potential to create medicines that persist longer in patients and avoid the risks associated with higher doses of chemotherapy.

ARDENT

Our most advanced hypoimmune product candidate is SC291, a CD19 allogeneic CAR T program that we are evaluating as a potential treatment for NHL and CLL in the ARDENT trial. Results of our early interim analysis of clinical safety and other clinical responses as well as immune responses to SC291 are discussed above under "Overview" and below under "Allogeneic T Cell Platform — SC291."

GLEAM

In November 2023, the FDA cleared our Investigational New Drug application (IND) to evaluate SC291 in patients with LN, ERL, and ANCA-associated vasculitis, which we refer to as our GLEAM trial. B-cell depleting therapies, such as anti CD20 antibodies (e.g., rituximab), have shown clinical benefit in the treatment of multiple autoimmune disorders that involve production of autoimmune antibodies, including LN, ERL, ANCA-associated vasculitis and many others. The rituximab trials in systemic lupus erythematosus (SLE) afforded the key insight that the depth of B-cell depletion was associated with improved patient responses. While these antibodies are adept at depleting B-cells in circulation for many patients, they are unable to penetrate deeply into the germinal centers of the lymph node and tissues, where the pathogenic B-cells continue to survive and drive disease. CD19 CAR T cells are known to cause deep B-cell depletion in CAR T recipients. Georg Schett and his research group in Erlangen, Germany tested the treatment of refractory SLE patients with autologous CD19 CAR T cells and were successful in inducing long-lasting drug-free remissions for these patients in the study. In our ongoing ARDENT trial, we have observed the pharmacodynamic effect of peripheral blood B-cell depletion, which refers to diminishing B-cell counts in the peripheral blood, associated with SC291 treatment in patients. While pharmacodynamic effects seen in oncology patients may not translate to patients with autoimmune disease, we believe these data increase the probability that SC291 treatment confers similar B-cell depletion, the putative mechanism of benefit, to patients with B-cell-mediated autoimmune disorder.

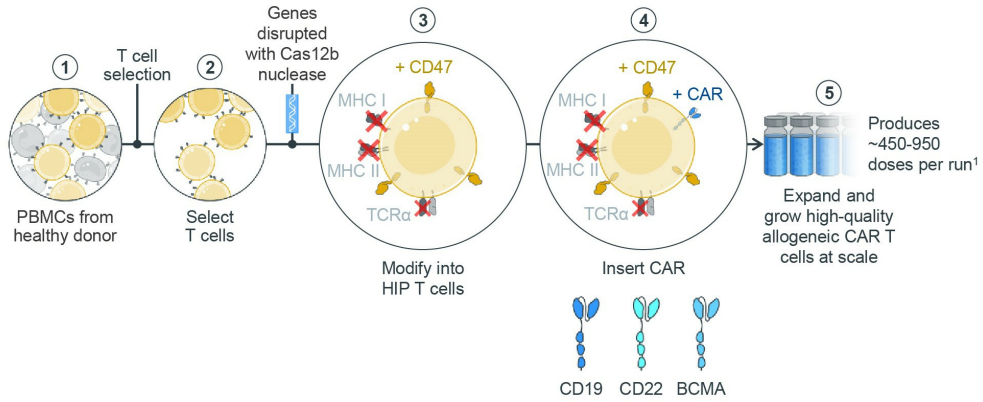
SC291 also provides the benefit of being available "off the shelf," avoiding the complex management of patients around the apheresis procedure for cell harvest and between cell harvest and infusion required for treatment with autologous CAR T products while also providing the potential for increased manufacturing scalability. We expect to share data from the GLEAM trial in 2024.

Initial clinical success with SC291 would support the expansion of our allogeneic CAR T efforts with additional product candidates targeting other patient populations. Our allogeneic T cell platform is designed to enable the substitution of CAR constructs in a modular fashion. For the near-term, we are prioritizing clinically-validated targets as well as CAR constructs, such as our CD19 CAR, that have shown promising safety and efficacy profiles in hematologic malignancies in the autologous context.

SC262

We are developing SC262, our hypoimmune-modified CD22-directed allogeneic CAR T program, initially as a potential treatment for patients with relapsed and/or refractory B-cell malignancies who have received prior CD19-directed CAR T therapy in NHL, CLL, and acute lymphocytic leukemia (ALL). In January 2024, the FDA cleared our IND to evaluate SC262 in this patient population. We refer to the Phase I clinical study as our VIVID trial. The CD22 CAR construct that we use in SC262, which we licensed from the National Institutes of Health, has already been evaluated in multiple academic clinical trials of autologous CAR T cell therapies, data from which have shown complete responses (CR) in a substantial number of patients that have relapsed following treatment with a CD19-directed CAR T therapy. Data from a Phase 1 trial (n=38) of NHL patients conducted at Stanford University, where 97% of patients were either refractory and/or relapsed after prior CD19 CAR T therapy, demonstrate a CR rate of 53% and an overall response rate (ORR) of 68%. Seventy-five percent of the CRs lasted 12 months or longer.

Modular Pipeline for Allogeneic CAR T Therapy



[1]~450 doses assumes the middle dose in the ARDENT Phase 1 study and ~950 doses assumes an autoimmune dose consistent with public data on current autoimmune dose levels.

Allogeneic CAR T development candidates are manufactured from T cells purified from donor PBMCs. T cells undergo genome modification to disrupt MHC class I and class II expression (which inactivates adaptive immune responses), disrupt TCR expression (which minimizes graft vs. host disease) and overexpress CD47 (which enables cells to evade the innate immune system, including macrophages and NK cells). Development candidates principally differ in the CAR expressed by the cells. Expansion during manufacturing allows production of hundreds of patient doses per donor (based on current scale and accounting for hold back necessary for testing and dose variability).

SC255

We are developing SC255, a B-cell maturation antigen (BCMA)-directed allogeneic CAR T, for the treatment of multiple myeloma (MM). The BCMA CAR construct that we use in SC255, which we licensed from IASO Biotherapeutics and Innovent Biologics is part of equecabtagene autoleucel (Fucaso; CT103A). China's National Medical Products Administration has approved the new drug application for this drug in adult patients with relapsed or refractory multiple myeloma who previously received 3 or more lines of therapy, including a proteasome inhibitor (PI) and an immunomodulatory drug (IMiD). Data from such trials presented at the American Society of Hematology Annual Meeting in December 2023 showed an overall response rate of 96%, a minimal residual disease (MRD) negativity rate of 94%, and a complete response/stringent complete response (CR/sCR) rate of 78% in 103 patients. At one year, 81% of patients continue to be MRD negative. The SC255 program has completed a battery of pre-clinical tests and is currently gated based on resource availability.

In the future, additional candidates may be nominated to address hematological malignancies, solid tumors, and autoimmune disease.

SC379

We are developing SC379, our PSC-derived glial progenitor cell (GPC) product candidate, as a therapy to deliver to patients with certain central nervous system disorders healthy allogeneic GPCs, which are the precursors to both astroglia and myelin-producing oligodendrocytes. SC379 has the potential to treat patients with myelin- and glial-based disorders, which represent a broad group of debilitating neurological disorders, such as multiple sclerosis (MS) and a number of neurodegenerative disorders, none of which have effective treatment alternatives. We intend to develop SC379 for the treatment of secondary progressive MS, Pelizaeus-Merzbacher disease (PMD), other myelin-based disorders, Huntington's disease, and other astrocytic diseases. Our goal is to begin clinical testing for SC379 as early as 2025.

PSC-derived Pancreatic Islet Cells

SC451

SC451 is our PSC-derived hypoimmune pancreatic islet product candidate for the treatment of diabetes, with an initial focus on type 1 diabetes mellitus (T1DM). Greater than 8 million patients worldwide have T1DM. T1DM is a disease in which a patient's immune system attacks and kills pancreatic beta cells, leading to complete loss of insulin production in affected individuals. Patients typically need to take multiple insulin injections every day for life. Although the introduction of insulin has had a profoundly positive impact on patients, people with T1DM have approximately 15 years shorter life expectancies than people without diabetes and are consistently at risk for complications such as coma, stroke, myocardial infarction, kidney failure, and blindness from poorly controlled blood glucose. We and our collaborators have shown that we can develop high quality stem cell-derived islet cells that, when transplanted in animal models, normalize blood glucose and cure diabetes. We have also shown that our hypoimmune cells induce no systemic immune response, even in non-human primates (NHPs) with a pre-existing immune response to non-hypoimmune cells, and that our allogeneic NHP hypoimmune islet cells survive for the duration of our NHP studies, the longest of which is about forty weeks. To demonstrate applicability in the context of T1DM, we have developed a proprietary mouse model in-house, with humanized immune cells from a T1DM patient, and showed that hypoimmune modifications enabled T1DM patient-derived stem cell islet cells to evade both the autoimmune and allogeneic response. As a result, we believe our stem cell-derived hypoimmune pancreatic islet cells have the potential to create a disruptive treatment for T1DM, offering patients life-long normal blood glucose without immunosuppression. We are working on process development and IND-enabling studies.

UP421

In November 2023, the Swedish Medical Products Agency authorized Uppsala University Hospital's clinical trial application (CTA) for an investigator-sponsored, first-in-human study evaluating UP421, an allogeneic, primary islet cell therapy engineered with our hypoimmune technology, in patients with T1DM (the IST). Human pancreatic islet transplantation from allogeneic donors into T1DM patients has been shown to reduce or even eliminate long-term exogenous insulin dependence, albeit when administered with immunosuppression which leads to toxicity. Under the IST, a group of experienced pancreatic islet transplantation experts will transplant allogeneic primary islet cells that have been genetically modified with the hypoimmune modifications into T1DM patients without immunosuppression. We believe that a stem cell-derived islet product candidate such as SC451 would likely maximize the benefit to patients, with superior manufacturing scalability and consistency when compared to primary islet cells. However, we are optimistic that immunology insights gained from the IST, particularly whether the hypoimmune modifications lead to long-term survival and evasion of either allogeneic or autoimmune killing of the cells, may provide direct insights and learnings applicable to SC451, potentially accelerating development of this product candidate. We expect data from the IST to be shared in 2024.

Our *ex vivo* Cell Engineering Platform

Overview

Ex vivo cell engineering aims to treat human disease by engrafting new cells to replace damaged, diseased, or missing cells in patients. Historically there have been four key challenges to *ex vivo* cell engineering:

- engraftment of the right cell in the right environment;
- appropriate function of the cells, necessitating an understanding of and ability to produce the desired cell phenotype;
- persistence of the cells in the host, particularly by overcoming immune rejection; and
- manufacturing the desired cell in the quantities required.

Our *ex vivo* cell engineering platform seeks to address these four challenges and is focused on engineering hypoimmune cells that engraft, function, and persist in patients by evading immune rejection. These cells are derived from sources that are scalable, and we believe that continued progress with this platform has the potential to create broad access for patients.

Our Approach to Building our ex vivo Cell Engineering Platform

We have approached the development of our *ex vivo* cell engineering platform by investing in solutions to address the key challenges outlined above:

- **Stem cell and disease biology.** We believe that it is critical to have expertise in the developmental biology of stem cell differentiation and a deep understanding of the desired cell biology of stem cell differentiation in order to generate cells that function appropriately, as well as a deep understanding of the desired cell phenotype. The latter requires expertise in normal and disease biology. Furthermore, clinical understanding of disease pathology and transplant medicine is required to determine how to engraft the right cell in the right environment. Each of our programs is led by a prominent clinician-scientist with deep expertise in both cell therapy and disease biology.

- **Immunology and genome modification.** We believe that a deep understanding of the immunological response to engineered cells is essential to unlocking the potential of *ex vivo* therapies. We have licensed technologies from Harvard University, the University of California San Francisco, Washington University, and others to enable this effort. In addition, in order to create successful hypoimmune cells, we are investing in building out our gene editing, genome modification, and gene insertion capabilities.

- **Manufacturing.** We are investing proactively in process development, including process optimization and scale up, analytical development, CMC regulatory, supply chain, quality, and other manufacturing sciences in order to develop processes that can enable scalable manufacturing of cell therapies and broad patient access. We have entered into agreements with contract development and manufacturing organizations (CDMOs) and other partners for access to facilities and reagents in our supply chain necessary to manufacture our product candidates. We have built a pilot manufacturing plant in South San Francisco, California and entered into a long-term lease agreement for a manufacturing facility in Bothell, Washington, where we intend to build our own clinical trial and commercial current Good Manufacturing Practice (cGMP) manufacturing capabilities. We entered into a lease agreement under which we have obtained access to manufacturing capabilities within University of Rochester Medical Center's cell-based manufacturing facility to support manufacturing for early-stage clinical trials. We are also investing to obtain and ensure access to high quality donor-derived T cells and GMP-grade PSC lines for our programs. We will continue to invest in our manufacturing capabilities to ensure our pipeline needs are met.

Our Approach to Building our ex vivo Cell Engineering Portfolio

We have prioritized cell types for our programs when:

- high unmet need can be addressed by cell replacement;

- existing proof of concept in humans and/or animal models demonstrates that cell transplantation should have a clinical benefit;

- evidence exists that the cell type can be successfully differentiated from PSC and that such stem cell-derived cells can function appropriately *in vivo;*

- there has been the ability to hire or partner with world experts in the field to ensure our programs are rooted in a deep understanding of the underlying cell and disease biology; and

- evading immune system rejection via the hypoimmune technology is either not required initially (such as for glial progenitor cells (GPCs)) or is the critical missing element to developing a cell therapy (such as islet cells).

Based on this prioritization, we are focused on three cell types: T cells, islet cells, and GPCs.

Historical context of ex vivo therapy

Blood transfusions have been a standard treatment for many patients for over 100 years. The first successful kidney transplant occurred in 1954, followed by the first successful heart transplant in 1967, demonstrating the transformative clinical potential of replacing damaged or missing cells in the body. Surgical enhancements have improved the success of engraftment, but lack of organ access, complex surgical procedures, and immune rejection of the donated organs have limited the impact of these procedures.

Progress in immunosuppressive regimens, such as the development of cyclosporine, has improved organ survival rates. However, substantial side effects and the fact that many patients are ineligible or non-compliant have reduced their impact.

Ultimately, the field has looked for a scalable source of therapeutic cells that can be accessed broadly at a manageable cost, as well as cells that can evade immune rejection without immunosuppression. The advent of stem cell technology and subsequent improvements in methods to generate functional differentiated cells at scale have the potential to address the shortage of donor tissues and organs. In addition, over the past decade, a deeper understanding of the immunology of HvGR, coupled with novel techniques to manipulate the immunological profile of cells via gene editing, have raised the prospect that *ex vivo* engineered cells can benefit patients without the requirement for significant immunosuppression.

Sources of allogeneic cells

There are three main potential sources of allogeneic cells, or cells that do not originate from the patient, and therefore have the potential to be manufactured and supplied at scale. These are embryonic stem cells (ESCs), induced pluripotent stem cells (iPSCs), and donor-derived cells. Our portfolio currently reflects a mix of sources, with the ambition of transitioning primarily to iPSCs over time.

Embryonic Stem Cells

The recognition that every cell in the body originates from a zygote, or fertilized egg, led to the research and ultimate discovery of human ESCs, with the derivation of the first human ESC line in 1998. ESCs are PSCs which have the potential to differentiate into any cell type and are derived from the inner cell mass of a blastocyst or pre-implantation stage embryo. They are typically cultured *in vitro* and grown through cycles of cell division, known as passages, until a line of cells is established that can proliferate without differentiating, and retain their pluripotency while remaining well characterized, including being free of potentially deleterious genetic mutations. Because PSCs can divide indefinitely without exhaustion, an ESC line can be used to generate cell banks, consisting of large numbers of well-characterized vials of cells, that can be frozen and stored for future use.

Induced Pluripotent Stem Cells

The discovery that mature, differentiated cells can be reprogrammed to be the equivalent of an ESC and capable of generating any cell type in the body has led to the research and ultimate development of human iPSCs, providing an alternative option as a source 3of stem cells for use in *ex vivo* engineered cells. A key breakthrough in 2006 demonstrated that mature cells could be reprogrammed via the expression of a small number of genes to result in pluripotent cells. These iPSCs have similar potential to ESCs to be used as an indefinitely renewable cell bank for manufacturing of cell-based therapies.

Donor-Derived Allogeneic Cells

Another source of cells, which we use in our T cell programs, comes from mature donor-derived allogeneic cells. Although these T cells are neither pluripotent nor from an infinitely renewable source, they can be obtained as mature cells from human donors at scale. The use of donor-derived cells for our T cell programs should allow us to rapidly advance the programs towards the clinic with the implementation of our hypoimmune technology.

Approach to Sources of Allogeneic Cells

The use of iPSCs as the starting material for our programs offers regulatory and cultural advantages over ESCs, and scale and product consistency advantages over donor-derived allogeneic cells. Our portfolio currently reflects a mix of sources, which is primarily driven by historical factors as well as current better characterization of genomic stability through differentiation. Our ambition is to transition primarily to iPSCs over time.

Crucial aspects of developing allogeneic cells from any source include a thorough characterization of the cells, a comprehensive understanding of the global regulatory environment, and an ability to maintain cells under the required conditions, such as cGMP, at various stages of the manufacturing processes. We believe our early investment in building capabilities in the science and manufacturing of these cells will increase our likelihood of success. This investment is anticipated to yield sources of cells suitable for the global clinical development and commercialization of *ex vivo* engineered cells for a broad patient population, in line with our vision to democratize access.

Background on Immunological Barriers to ex vivo Therapies and Current Limitations

Starting with studies in renal transplantation in the early 1900s, it became clear that there were immunological factors preventing successful transplantation. Initially, transplant rejection was suspected to be mediated by an antibody response, but in the 1950s, it was discovered that cell-mediated immune pathways also play a critical role.

Further studies established that T cells play a key role in the host immune response to transplant. T cells belong to the “adaptive” immune system, recognizing and eliminating “non-self” cells via recognition of differences in cell-surface proteins encoded by the major histocompatibility (MHC) locus. There are two types of MHC molecules: MHC class I, expressed on the surface of almost all nucleated cells, and MHC class II, expressed constitutively on professional antigen presenting cells (APC), including macrophages and dendritic cells. Expression of MHC class II is also induced in many additional cells in the context of inflammation. MHC class I molecules typically display peptides from degraded intracellular proteins on the cell surface. Cells display peptides from normal “self” proteins on MHC class I, which typically will not activate an immune response due to a process called tolerance, where the body recognizes these peptides as “self.” However, if a cell displays a peptide from a foreign or mutated protein on MHC class I, for example, as a result of a protein mutation, it may result in the activation of a cytotoxic T cell response specific to the peptide-MHC complex via the T cell receptor (TCR) on the T cell surface. The activated T cell then eliminates the cell. MHC class II molecules typically display peptides derived from phagocytosis of extracellular proteins on the surface of APCs. These peptide-MHC complexes interact with TCRs on helper T cells, such as CD4+ T cells, resulting in a downstream cellular and humoral immune response. The humoral immune response leads to antibody production against foreign proteins. In allogeneic transplants, the cellular and humoral processes can recognize proteins from the donor as “foreign,” resulting in an immune response to the transplant, including potential elimination of the transplanted cells. In the allogeneic setting, MHC proteins can be highly immunogenic due to their inherent polymorphism, increasing the risk of the recognition of transplants as “foreign.” This immunogenicity underlies the basis for MHC typing and matching to assess and reduce the risk of organ transplant rejection.

Many groups have attempted to engineer cells that can evade the adaptive immune system, typically by downregulating or eliminating expression of MHC molecules on the surface of cells. Although this approach can reduce the adaptive immune response to donor cells, the human immune system has evolved so that parts of the innate immune system will recognize cells missing MHC molecules and eliminate them. For example, NK cells express receptors known as inhibitory killer-cell immunoglobulin-like receptors (inhibitory KIRs). KIRs recognize self MHC class I molecules on the surface of cells and provide inhibitory signals to the NK cells to prevent their activation. Cells missing MHC class I molecules are correspondingly eliminated by NK cells because of the lack of inhibitory KIR signaling and a resulting cytolytic activation. Known as the “missing self-hypothesis,” this important redundancy in immunology enables the elimination of virally infected or transformed cells that have downregulated MHC class I, but it has complicated the development of allogeneic cells as broadly applicable therapeutics. Our hypoimmune technology seeks to engineer cells to avoid immune rejection by addressing both the adaptive and innate immune response.

There are three key strategies that have been used to date to overcome immune rejection, with limited success:

- **Immune Suppression**. Cyclosporine and other molecules that suppress T cell responses are commonly used, and many patients have been helped by these approaches in areas such as an organ transplantation. However, immune suppression often leads to significant systemic side effects, including a decreased ability to resist infections, increased susceptibility to cancer, and a wide variety of organ toxicities. Furthermore, organ transplant recipients typically require immunosuppression on a lifelong basis, and any disruption in this immunosuppression can rapidly trigger transplant rejection.

- **Matching HLA Type**. A second approach to overcoming immune rejection is to find a donor with a matched human leukocyte antigen (HLA) type. In humans, HLA is a synonym for MHC. This approach addresses the root of the mechanism that the immune system uses to identify “non-self” cells and has achieved some success. Finding a matched donor, however, can be difficult and is usually limited to close relatives who are willing and able to donate. Although some have advocated for creating large banks of cells that match a wide variety of HLA types, even with fully matched HLA class I and class II donors and recipients, there is a need for at least some immune suppression due to the presence of numerous minor antigen mismatches.

- **Autologous Approaches**. More recently, researchers have pursued autologous approaches, where a patient’s own cells are modified and introduced back into the patient as a graft. These cells may avoid immune rejection as they would be recognized as “self.” Autologous approaches have demonstrated effectiveness in certain diseases, such as autologous CAR T cells for hematological malignancies, but these approaches are limited in their adoption due to manufacturing cost and complexity. Furthermore, autologous approaches are generally limited to cells that exist in the patient in suspension, such as blood cells.

Our Solution – Hypoimmune Technology

To address the challenge of immune rejection with allogeneic cell transplantation, we are developing our hypoimmune technology, which uses genome modification to introduce permanent changes to the cells. We are applying the hypoimmune technology to PSCs, which can then be differentiated into multiple cell types, and to donor-derived allogeneic T cells, with the goal of making potent CAR T cells at scale and transplanting allogeneic cells into patients without the need for systemic and prolonged immune suppression. We believe that enabling this capability has the potential to enable *ex vivo* engineered cells to become an important therapeutic modality alongside small molecules, protein biologics, and *in vivo* engineered cells.

Some of our scientific founders and their collaborators have worked on creating hypoimmune cells for well over a decade. A key insight that informed their work is the phenomenon of fetomaternal tolerance during pregnancy. The fetus, despite having half its genetic material from the father, is not rejected by the mother's immune system. However, after birth, few if any children would qualify as a matched donor for a cell or organ transplant for their mother. These scientists categorized the differences of the maternal-fetal border and systematically tested them to understand which, if any, of these were most important to immune evasion. They have tested these changes both *in vitro* and *in vivo* in animal models.

Designing Hypoimmune Cells

Our goal is to create a universal cell capable of evading immune detection, regardless of cell type or transplant location. Our current clinical hypoimmune technology, which is being used in our SC291, SC262, and SC255 product candidates, combines three genome modifications to "hide" these cells from the host immune system:

- disruption of MHC class I expression;
- disruption of MHC class II expression; and
- overexpression of CD47, a protein that enables cells to evade the innate immune system, including macrophages and NK cells.

Once these modifications have been applied to a cell, we refer to that cell as a hypoimmune cell.

Preclinical Development of Hypoimmune Cells

We and our licensors have carried out a series of experiments in various model systems of increasing immunological complexity. These included (i) transplanting undifferentiated mouse hypoimmune iPSCs into MHC mismatched allogeneic mice, (ii) transplanting mouse hypoimmune iPSC-derived differentiated cells, such as endothelial cells, into MHC mismatched allogeneic mice, (iii) transplanting human hypoimmune iPSCs into MHC mismatched humanized allogeneic mice, (iv) transplanting NHP hypoimmune iPSCs into MHC mismatched allogeneic NHPs, (v) transplanting NHP hypoimmune iPSC-derived differentiated cells, such as cardiomyocytes, into MHC mismatched allogeneic NHPs, and (vi) transplanting NHP hypoimmune primary cells, such as islets, into MHC mismatched diabetic and non-diabetic NHPs.

Each mouse experiment evaluated:

- whether hypoimmune cells can be successfully transplanted into the recipient without the need for immunosuppression and without eliciting an immune response; and
- whether differentiated cells derived from our hypoimmune cells were successfully engrafted in the recipient without needing immunosuppression and without eliciting an immune response.

We have also investigated the NHP immune response to human iPSCs, NHP iPSCs, NHP iPSC-derived differentiated cells, and NHP primary islets. Importantly, we have shown that hypoimmune primary islets can mediate insulin independence in a fully immunocompetent diabetic NHP without immunosuppression. This confirms that hypoimmune modifications confer immune evasion without compromising islet function in this setting. We are encouraged by the data from these investigations, given the similarity of the NHP immune system to the human immune system and that NHP models represent the strictest test outside of evaluating these cells in humans. We are evaluating both iPSCs as well as differentiated cells transplanted into the microenvironments we intend to target in humans. Based on the results of these NHP studies, we expect to test these hypoimmune cells in humans as a next step.

Mouse iPSC-derived hypoimmune cells transplanted into MHC mismatched allogeneic mouse

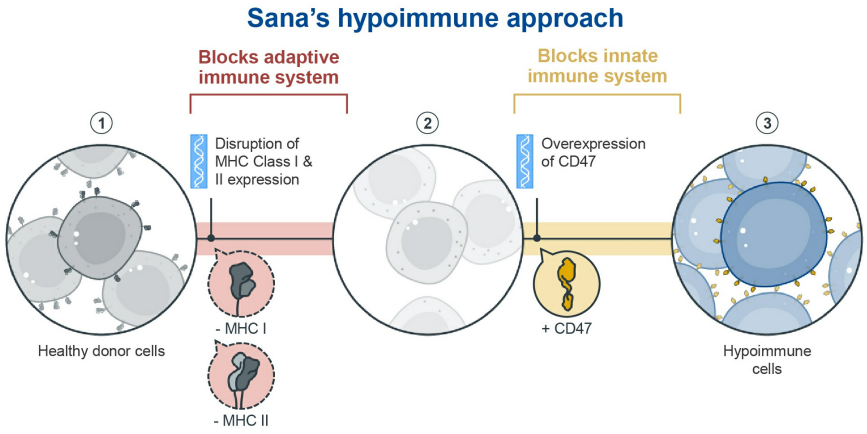
Mouse hypoimmune iPSCs transplanted into an MHC mismatched allogeneic mouse were protected from the mouse immune system, and no evidence was seen of either adaptive or innate immune system activation. The control arm transplanted unmodified mouse iPSCs into MHC mismatched allogeneic mice, and, as expected, these unmodified mouse iPSCs were rapidly rejected by the recipient mouse immune system with a robust adaptive immune response. In another experiment, the genes that code for MHC class I and MHC class II expression were disrupted. These modifications protected the cells from the recipient mouse's adaptive immune system, but NK cells rapidly killed the transplanted cells. These data highlight the importance of all three genome modifications (MHC class I, MHC class II, and CD47 overexpression) in protecting cells from the immune system following an allogeneic transplant.

Next, to ensure that hypoimmune genome modifications protected differentiated cells and that these modifications did not impact the ability of iPSCs to differentiate into various cell types, commonly referred to as pluripotency, the scientists tested whether the hypoimmune iPSCs cells could be differentiated into three different cell types, function *in vivo*, and evade the host immune system. The three cell types were cardiomyocytes, endothelial cells, and smooth muscle cells. The hypoimmune iPSCs successfully differentiated into all three cell types, the cells functioned in the mouse, and the transplanted cells survived for the full standard observation period with no evidence of immune system activation despite having received no immune suppression. Differentiated cells derived from unmodified iPSC cells led to immune activation in the host mice, which did not survive. These data provide initial proof of concept that iPSCs can be genetically modified and differentiated into target cells that can engraft, function, and evade the recipient's immune system following transplantation.

Human iPSC-derived hypoimmune cells transplanted into MHC mismatched allogeneic humanized mouse

Having demonstrated the ability of mouse iPSC-derived hypoimmune cells to satisfy each of three testing criteria, the experiments were advanced to evaluate human hypoimmune cells by using a "humanized" mouse system, generated by grafting a functioning human immune system in place of the mouse immune system. We also evaluated the ability to successfully engineer human hypoimmune cells from human iPSCs and whether differentiated cells derived from human hypoimmune cells retain biological function.

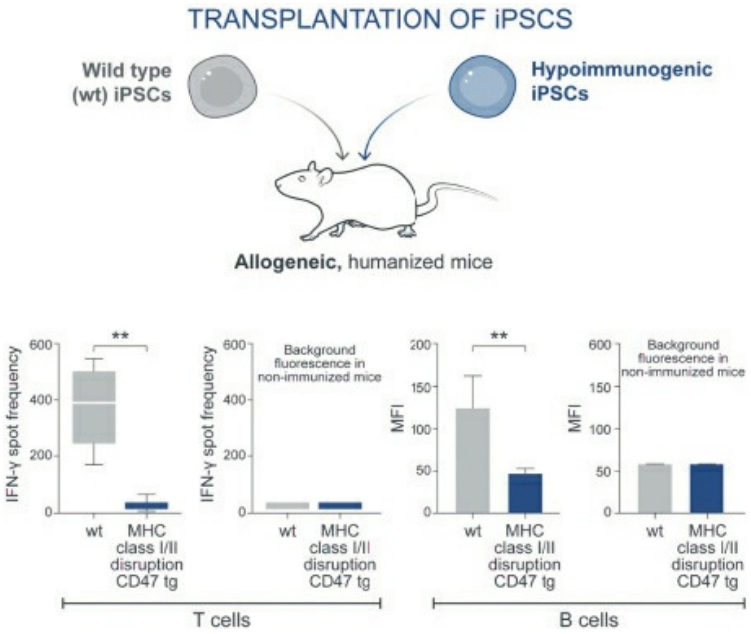
Creating Hypoimmune Therapeutic Cells from Human iPSCs



Our current clinical hypoimmune technology combines the following three gene modifications to "hide" cells from the host immune system: disruption of MHC class I and class II expression (which inactivates adaptive immune responses), and overexpression of CD47 (which "hides" cells from the innate immune system, including macrophages and NK) cells. PSCs from healthy donors are used as the starting material and are then genetically modified with the hypoimmune modifications. These edited cells are then differentiated into cell types of therapeutic interest, which could potentially be administered to the patient as "off the shelf" therapies.

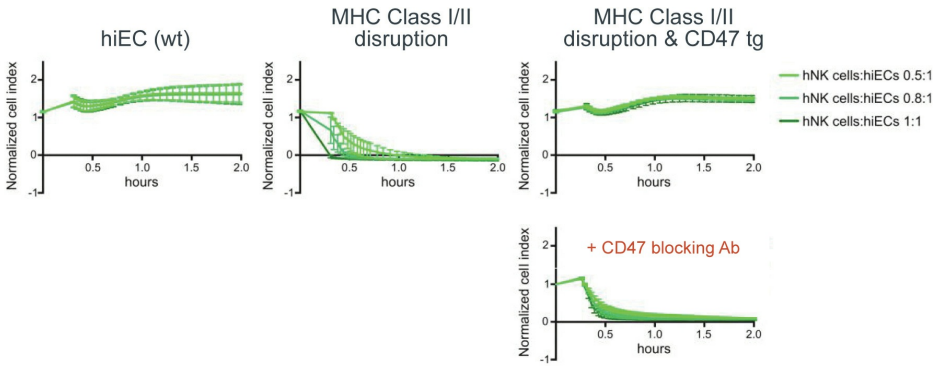
First, the three genome modifications described above were replicated in human iPSCs to engineer a human hypoimmune cell line with properties comparable to the mouse hypoimmune cells *in vitro*. Next, unmodified human iPSCs were transplanted into MHC mismatched humanized mice. It was observed that these unmodified human iPSCs were rapidly rejected. Human hypoimmune cells were then transplanted into MHC mismatched humanized mice. It was observed that the human hypoimmune cells survived the full length of the experiment and failed to elicit any type of immune response. From this data we concluded that in humanized mice, human hypoimmune cells can evade the immune system. Pluripotency of human hypoimmune cells was confirmed by differentiation into two different cell types, endothelial cells and cardiomyocytes, which exhibited the characteristics of normal endothelial cells and cardiomyocytes. Finally, to test whether the differentiated cell types derived from human hypoimmune cells could continue to evade the immune system, the differentiated cells were transplanted into humanized mice, and the transplanted cells survived for the full standard observation period. In contrast, differentiated cells derived from unmodified human iPSC cells did not survive after being transplanted, as anticipated. It was also observed that the hypoimmune endothelial cells formed primitive vasculature with active blood flow, and the hypoimmune cardiomyocyte cells matured into functional-looking heart cells.

Absence of T and B-Cell Activation Following Transplantation of Hypoimmune Human iPSCs into Mismatched Humanized Mice



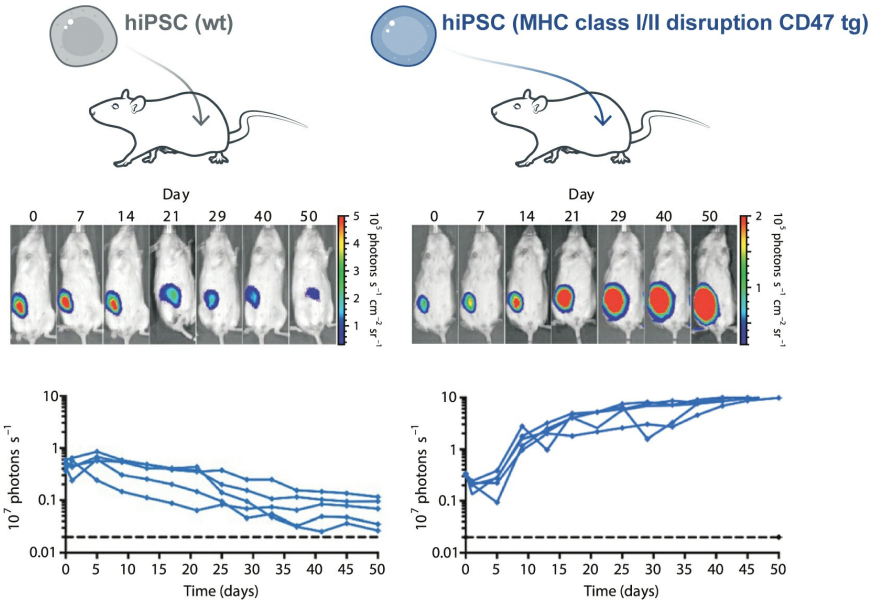
Left panels: T cell activation was measured by EliSpot counts for interferon-gamma production. Immune cells from mice that received wild type (wt) iPSC grafts show a brisk interferon response when tested against allogeneic wt iPSC grafts. By contrast, immune cells from mice that received hypoimmune cells (MHC class I/II disruption, CD47 tg) cells show only minimal interferon production when exposed to allogeneic hypoimmune cells, comparable to background frequency in non-immunized mice. Right panels: B-cell activation was measured by antibody binding to each cell type, shown as mean fluorescence intensity (MFI). Wild type cells exhibit significant antibody binding when incubated with serum from mice that received wt cells. By contrast, hypoimmune cells show only background levels of binding when treated with serum from mice that received hypoimmune cells. Adapted from Deuse et al, Nature Biotechnology 2019.

CD47 is Required to Protect Hypoimmune Cells from Killing by Human NK Cells



Human iPSCs were differentiated into endothelial cells (hiECs) and plated as a monolayer in a multielectrode system. After exposure to NK cells, monolayer viability was measured by electrical impedance, indicated here as normalized cell index. As expected, wt cells were not killed by NK cells. By contrast, cells lacking MHC class I and II (MHC class I/II disruption), but not expressing CD47, were rapidly killed. Addition of CD47 tg prevented killing by NK cells. A blocking antibody to CD47 abolished protection from NK cells, affirming the importance of CD47 overexpression in protection from innate immune cell killing. From Deuse et al, Nature Biotechnology 2019.

Survival of Hypoimmune Human iPSC Grafts in MHC-Mismatched Humanized Mice

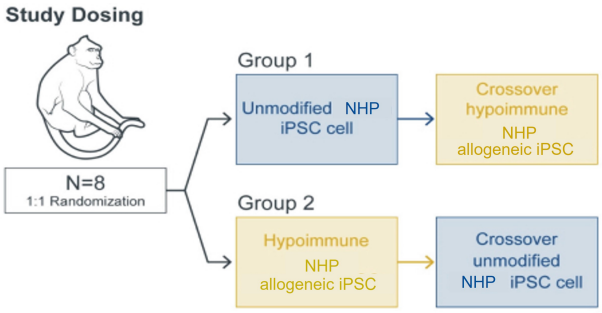


Wild type (wt) and hypoimmune (MHC class I/II disruption and CD47 tg) iPSCs were engineered to express firefly luciferase before transplantation. Emission of light was used as an index of graft cell viability. Sequential light emission scans from the same representative animal receiving wt cells show progressive loss of graft viability, indicating graft rejection, confirmed quantitatively in the line tracings below. By contrast, mice receiving hypoimmune cells show graft expansion over the course of the experiment, indicating immune evasion. From Deuse et al, Nature Biotechnology 2019.

NHP hypoimmune cells transplanted into NHPs

To evaluate immune evasion properties of the hypoimmune cells, we have tested the immune response to and survival of hypoimmune iPSCs from NHPs by transplantation into an allogeneic NHP recipient without immunosuppression.

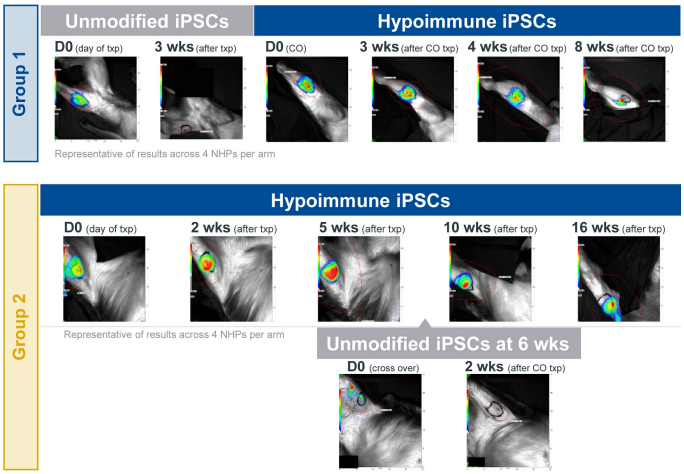
Design for Allogeneic Study Involving Wild Type (Unmodified) and Hypoimmune NHP iPSC Delivery to NHPs

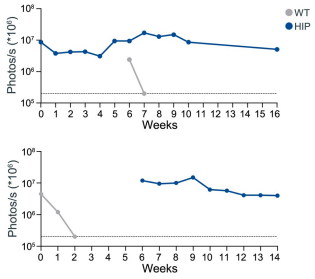


Study Detail:
- Average 6 weeks between administrations
- Immune response was measured before iPSC injection and 1 weeks, 2 weeks, and 4 weeks after administration
- All time points are the same for all injections

The study involved a randomized group of eight NHPs distributed into two cohorts of four NHPs each. The first cohort received an initial intramuscular injection of unmodified NHP iPSCs in one leg and a second injection of NHP hypoimmune cells at six weeks in the other leg (i.e., a crossover design). The second cohort received an initial injection of NHP hypoimmune cells in one leg, which allowed assessment of immune evasion in a naïve recipient. In order to model certain aspects of autoimmune disease, this cohort also received a second injection of unmodified NHP iPSCs in the other leg, which enabled assessment of the impact of injecting hypoimmune cells into an NHP with a pre-existing immune response to unmodified cells. No immunosuppression was administered to any of the NHPs in the study.

Allogeneic Hypoimmune iPSCs Survive *in vivo* in NHPs with an Intact Immune System

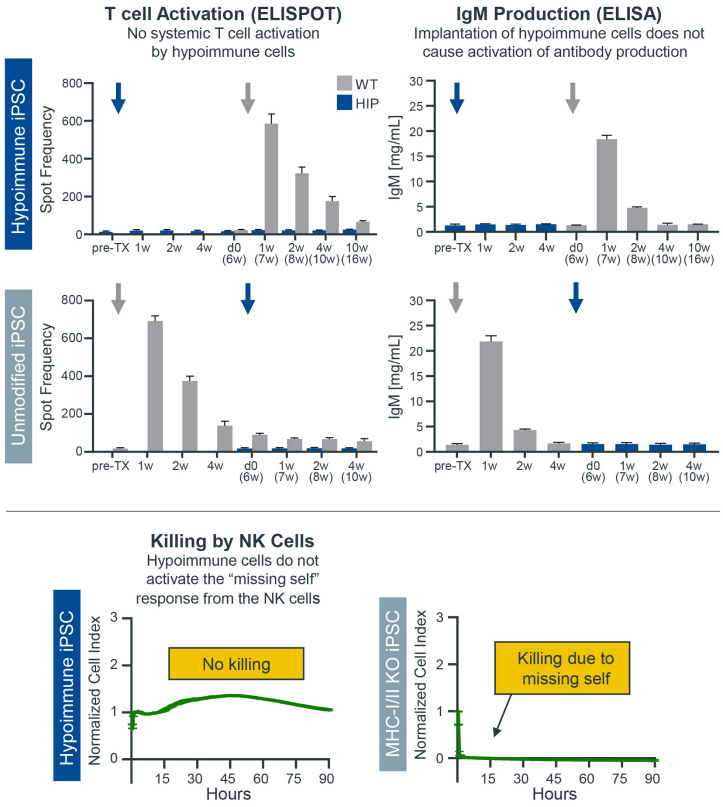




Upper panel: Unmodified wild type (wt) NHP iPSCs (Group 1, top row) or hypoimmune NHP iPSCs (Group 2, bottom row) were introduced via intramuscular injection into allogeneic NHPs. Unmodified NHP iPSCs are undetectable in recipient NHPs by week 3 while hypoimmune NHP iPSCs introduced into naïve NHPs were viable and detectable for 16 weeks post injection. At 6 weeks following the initial injection, NHPs were injected with the crossover cell type (Group 1 with hypoimmune NHP iPSCs and Group 2 with wt unmodified iPSCs). In these crossover experiments, hypoimmune NHP iPSCs survived even when the NHP had been exposed to unmodified iPSCs. Unmodified iPSCs injected into NHPs previously injected with hypoimmune iPSCs were rapidly killed with no observable impact on the hypoimmune NHP iPSCs that continued to remain viable. Data shown from single NHP belonging to each group; images are representative for four NHPs receiving hypoimmune iPSCs and four NHPs receiving wt iPSCs.

Lower panel: iPSC survival in vivo is followed over time using bioluminescence imaging (BLI).

Absence of T Cell, B-Cell, or NK Cell Responses Following the First Delivery and Crossover of Hypoimmune NHP iPSCs into NHPs



Upper panel: Immune cells from NHPs receiving hypoimmune iPSCs showed no response when exposed to hypoimmune iPSCs in vitro (Row 1) in contrast to wt iPSCs (Row 2). Lower panel: Neither unmodified nor hypoimmune iPSCs were susceptible to killing by NK cells, indicating protection from the "missing self" signal. Data above are collected from four NHPs in each experimental arm.

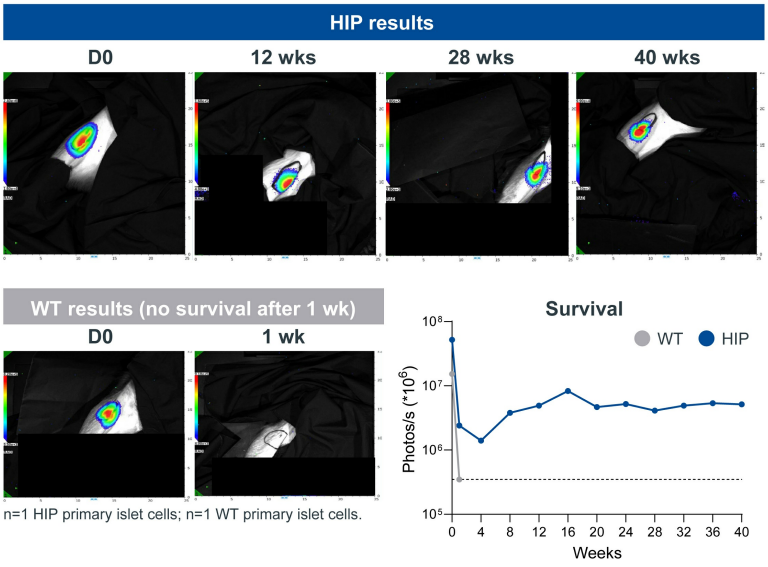
NHP hypoimmune iPSCs grafted into NHPs elicited no detectable systemic immune responses, including no T cell activation and no antibody formation. Innate immune responses mediated by macrophages and NK cells were also undetectable. The transplanted hypoimmune cells were alive and detectable in the four allogeneic recipients for the duration of the study, which was 16 weeks for two of the NHPs and 8 weeks for the other two NHPs. To our knowledge, this is the first instance of prolonged graft survival in an allogeneic transplant setting without immunosuppression in NHPs. By contrast, systemic immune responses from T cells as well as IgM and IgG antibodies were generated to iPSCs without the hypoimmune edits, and the iPSCs were rapidly rejected within two to three weeks.

In the crossover portion of this experiment, injection of NHP hypoimmune iPSCs into NHPs that had previously received unmodified iPSCs again elicited no systemic responses as tested in assays for T cell or antibody responses. Similarly, macrophage and NK responses could not be detected. Correspondingly, these iPSCs survived for the full eight weeks that they were monitored, suggesting that pre-existing immunity to unmodified human iPSCs had no impact on hypoimmune iPSC survival. By contrast, in the NHPs that had previously been injected with hypoimmune iPSCs, the unmodified NHP iPSCs elicited both T cell and antibody responses. Notably, these unmodified iPSCs were rapidly rejected by the NHP within one to two weeks, while the previously injected hypoimmune iPSCs continued to be viable in the other leg of the NHP. These results confirm that the survival of the hypoimmune allo-graft was not an artifact of an impaired immune system or immune response in the recipient NHP. They also suggest that these hypoimmune iPSCs have the potential for immune evasion even the context of a new immune response toward iPSCs without these edits.

In addition, we recently conducted experiments in which we observed immune evasion and cell survival of hypoimmune NHP iPSC-derived cardiomyocytes and retinal pigment epithelial cells (RPEs). In separate experiments, these cardiomyocytes and RPEs were injected into the hearts and eyes (subretinal space), respectively, of healthy allogeneic NHP recipients without immunosuppression. Both the hypoimmune cardiomyocytes and RPEs were found to evade systemic adaptive and innate immune responses and survived for the duration of the applicable experiment. Separately, we have shown that hypoimmune NHP islet cells transplanted into a non-matched allogeneic NHP survive for the duration of the study, which at this point is 40 weeks.

We conducted an experiment to better understand whether hypoimmune modifications impair the function of islet cells and to confirm that these modifications enable the islet cells to evade immune responses. For these experiments, we made hypoimmune genetic modifications to NHP primary islets and then transplanted these islets intramuscularly, without immunosuppression, into a different NHP. We found that the hypoimmune islets were viable for the full duration of the study (approximately 10 months) and did not elicit either an adaptive or innate immune response. By contrast, unmodified NHP primary islets injected into a separate NHP were rejected within one week. These results suggest that hypoimmune modifications enable allogeneic immune evasion by NHP primary islet cells and increase our confidence in the clinical translatability of this approach.

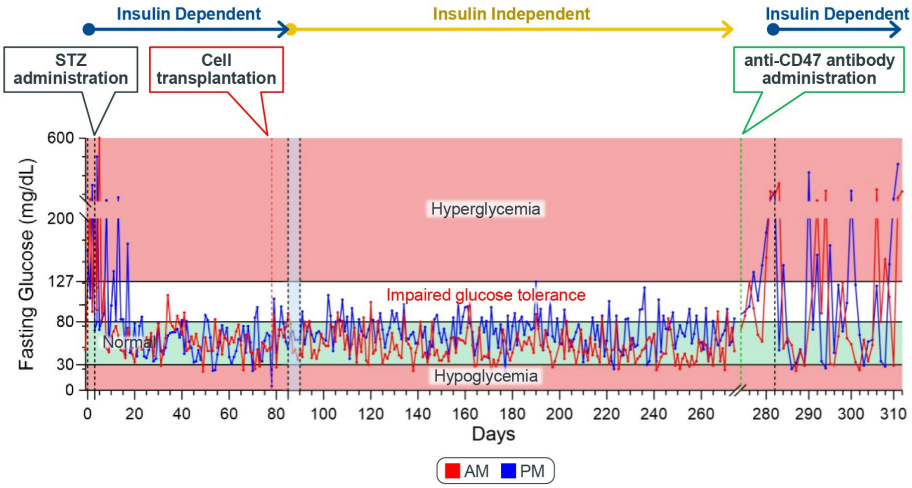
Primary Allogeneic Hypoimmune NHP Pancreatic Islet Cells Survive in NHPs for 10 Months Without Immunosuppression



Hypoimmune NHP primary islets (top row) or unmodified wild type (wt) NHP primary islets (bottom row) were introduced via intramuscular injection into allogeneic NHPs. Unmodified NHP primary islets are undetectable in recipient NHPs by week 1 while hypoimmune NHP primary islets introduced into naïve NHPs were viable and detectable until the experiment was terminated at 40 weeks following injection. Primary islet cell survival in vivo is followed over time using bioluminescence imaging (BLI).

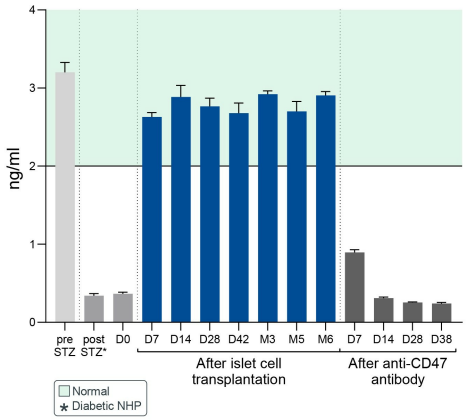
In January 2024, we presented data from a study transplanting allogeneic HIP-modified pancreatic islet cells into a fully immunocompetent, diabetic NHP. Subsequent to diabetes being induced in the NHP with streptozotocin, daily insulin injections were performed to re-establish glucose control. After 78 days, the NHP underwent transplantation of HIP primary islets by intramuscular injection, resulting in insulin independence without the use of any immunosuppression. As early as one week after the transplantation, the NHP's serum c-peptide level had normalized, and it remained stable throughout the follow-up period of six months. The NHP showed tightly controlled blood glucose levels for six months, was completely insulin-independent, and was continuously healthy throughout this period with no use of any immunosuppression. Up to six months following HIP primary islet transplantation, peripheral blood mononuclear cells and serum were obtained from the NHP for immune analyses. HIP primary islets showed no T cell recognition, no graft-specific antibodies, and were protected from NK cell and macrophage killing. To demonstrate that the NHP's insulin-independence was fully dependent on the HIP primary islets and that there was no regeneration of the animal's endogenous islet cell population, we triggered the destruction of the HIP primary islets using a CD47-targeting antibody. This resulted in a loss of glycemic control and return to exogenous insulin dependence. We believe these data demonstrate potential evidence for immune evasion of HIP primary islets, graft-mediated insulin-independence of the diabetic NHP, and a potential safety strategy.

Hypoimmune Islet Cells Achieve Insulin Independence after Allogeneic Transplantation in a Fully Immunocompetent NHP



Fasting glucose monitoring in an NHP for about 10 months encompassing pre STZ, post STZ, post HIP islet cell transplant, and post anti-CD47 phases of the study: Diabetes mellitus was induced in a male NHP with STZ and daily insulin injections were started. Blood glucose was monitored twice daily and showed major instability over approximately two weeks until a well-controlled steady state was reached. After 78 days, the NHP was underwent intramuscular transplantation with allogeneic HIP islet cells. Insulin support was gradually withdrawn over approximately 12 days. The NHP did not receive immunosuppression before, during or after HIP islet cell transplantation. The NHP showed tightly controlled blood glucose levels and was completely insulin independent for six months. Following anti-CD47 mediated ablation of the graft, blood glucose levels increased steadily. Insulin injections were resumed eight days after the start of anti-CD47 antibody at the previously established maintenance dose. Despite insulin supplementation, widely fluctuating blood glucose levels were observed and no steady state was re-established for the remainder of the study.

Hypoimmune Islet Cells Normalize C-peptide Levels after Allogeneic Transplantation in a Fully Immunocompetent NHP



NHP serum C-peptide declines after induction of diabetes post STZ. As early as one week after the transplantation, NHP serum c-peptide level normalized (indicated by c-peptide levels of >2ng/ml) and remained stable throughout the follow-up period of six months. Destruction of HIP islet cells by anti-CD47 antibody coincides with the decline in C-peptide levels in the serum, confirming that HIP islet cells were required for continued production of C-peptide in the NHP.

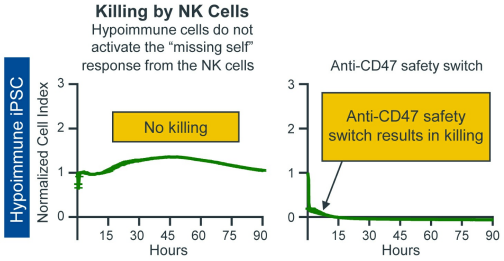
Based on our preclinical data to date, we believe our hypoimmune technology has the potential to address the most fundamental limitation of *ex vivo* therapies, persistence, and thereby unlock waves of potentially disruptive therapies across a variety of cell types.

Safety Switch for Hypoimmune Cells

We are actively investigating approaches to control hypoimmune cells after administration into the patient. If necessary, the aim of these "safety switches" would be to provide a mechanism to eliminate hypoimmune cells within the body in a targeted fashion when the cells are not in a location where physical removal is feasible. Such a safety switch would mitigate the potential risk of adverse outcomes if a hypoimmune cell, which can, by its nature, evade the immune system, becomes infected with a virus or undergoes oncogenic transformation.

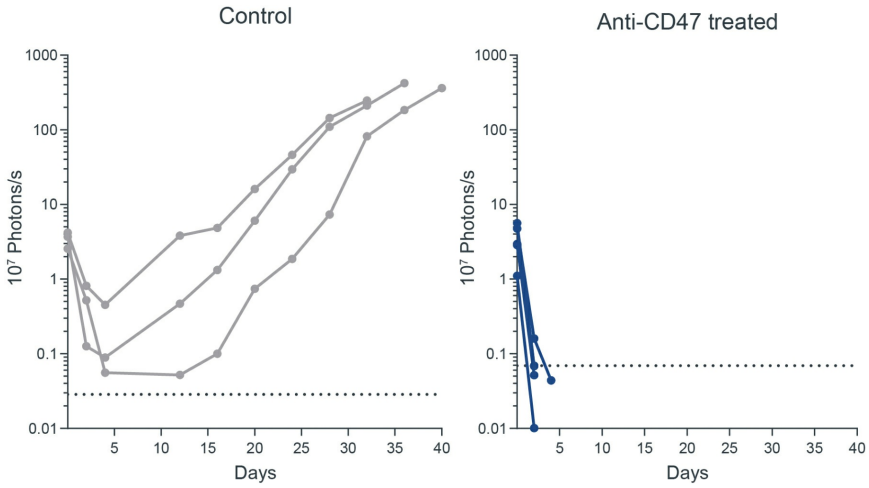
One approach we are exploring as a safety switch is re-sensitization of the hypoimmune cells to innate cell killing via administration of a blocking anti-CD47 antibody. We have tested the effectiveness of this approach in iPSCs and teratomas (a particular tumor formed by pluripotent cells with histological features from all three germ layers), both bearing the hypoimmune modifications. Using hypoimmune NHP iPSCs, we observed *in vitro* that the addition of an anti-CD47 antibody binds to and blocks CD47 expressed in the hypoimmune cells and restores their sensitivity to the missing-self killing response mediated by NK cells. We also assessed this strategy in mice that were transplanted with human iPSCs that formed small teratomas. Finally, we have conducted *in vitro* and *in vivo* experiments with this strategy using a number of human cancer lines, showing that an anti-CD47 antibody resensitizes cancer cells to killing by NK cells and macrophages. Treatment with an anti-CD47 antibody resulted in the loss of immune evasion and the rapid killing of these transplanted cells. As described above, use of an anti-CD47 antibody in a fully immunocompetent NHP was sufficient to trigger destruction of transplanted allogeneic HIP islet cells following initial survival of such cells for six months. We believe these data support use of anti-CD47 antibodies as a potential safety strategy. We have identified several additional safety switches with *in vivo* activity and intend to continue to explore them and potentially include multiple safety switches in our therapeutic programs moving forward.

Anti-CD47 Administration Results in the Rapid Clearance of Hypoimmune NHP iPSCs *In Vitro*



Left panel: Hypoimmune NHP iPSCs do not induce killing by NK cells in an in vitro killing assay. Right panel: By contrast, anti-CD47 antibody treated hypoimmune NHP iPSCs are no longer able to evade missing-self responses mediated by NK cells and are killed rapidly.

Anti-CD47 Administration Results in the Rapid Clearance of Human iPSC-derived Teratomas in a Humanized Mouse Model

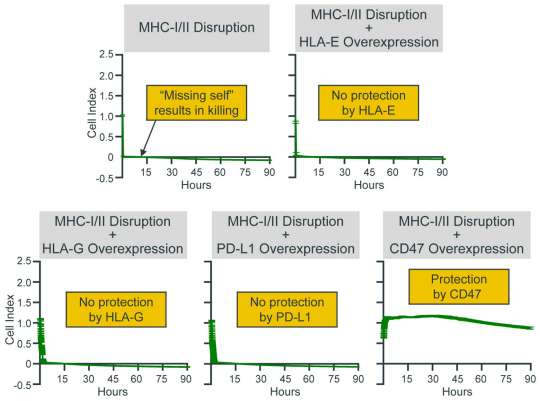


Left panel: Human iPSCs proliferate (as visualized by luminescence of live cells) and form teratomas in NSG mice (n=3) with adoptive transferred human NK cells. Administration of isotype control has no impact on hypoimmune iPSC survival. Right panel: Blocking of CD47 in vivo results in killing of hypoimmune iPSCs (as visualized by luminescence of live cells) in NSG mice (n=5) with adoptive transferred human NK cells.

CD47 overexpression is differentiated in inhibiting "missing self" response relative to other approaches

As part of our ongoing efforts to further refine our hypoimmune technology, we evaluated the effectiveness of the overexpression of CD47 in comparison to other molecules that have at least some ability to inhibit innate immune responses. We carried out these head-to-head comparisons in K562 cells, a cell line that is naturally deficient in MHC class I and class II, and in which the lack of the MHC class I molecule should result in rapid cell killing by stimulated innate immune cells such as NK cells due to the activation of the "missing self" response. We compared three molecules, HLA-E, HLA-G, and PDL-1, each of which has previously been thought to play a role in inhibiting innate immune responses, against CD47. In this assay, overexpression of these three molecules conferred limited protection from NK cell killing as compared to CD47 overexpression. This difference in activity may be the result of the more ubiquitous presence of the receptor for CD47 on innate immune cells relative to the presence of receptors for these other immunomodulators. Although these results do not rule out a role for these other molecules in inhibiting NK cell responses, they suggest that CD47 may be sufficient to nullify the NK cell-mediated missing-self response.

CD47 Overexpression is Differentiated in Inhibiting "Missing Self" Response Relative to Other Approaches



Panels above show in vitro killing assays mediated by NK cells. Cells missing MHC molecules are killed by NK cells, as measured by rapid decline in cell index. Overexpression of immunomodulatory molecules such as HLA-E, HLA-G, or PDL-1 in cells missing MHC molecules did not block NK cell killing. By contrast, overexpression of CD47 blocked NK cell mediated missing-self response.

Our *ex vivo* Cell Engineering Pipeline

Allogeneic T Cell Programs (SC291, SC262, SC255)

Our allogeneic T cell programs utilize T cells from healthy donors to generate CAR T therapies for various targets, including CD19, a protein expressed on the cell surface of B-cell malignancies, for the potential treatment of patients with relapsed and/or refractory B-cell- malignancies and autoimmune diseases. We believe that applying our hypoimmune technology to allogeneic T cells will enable us to create differentiated allogeneic CAR T therapies.

We believe our allogeneic T cell programs are potentially disruptive programs that could address the limitations of adoptive T cell therapy for cancer. Specifically, as part of our allogeneic T cell programs, we have the opportunity to perform multiple gene edits in a T cell, which may allow us to make intentional modifications to control T cell function or deliver more complex chimeric receptors and signal integration machinery to enable the T cell to distinguish tumor cells based on surface antigen combinations and improve the specificity of targeting. These approaches may prove especially valuable in targeting solid tumors, which have remained largely refractory to CAR T approaches to date. We also have developed a scaled manufacturing process that we believe we can rapidly leverage to manufacture allogeneic CAR T cells across multiple targets.

Our most advanced product candidate is SC291, a CD19-directed allogeneic CAR T program. We are currently enrolling and dosing patients in the ARDENT trial evaluating SC291 in patients with NHL and CLL. In addition, in November 2023, we received IND clearance for the clinical study of SC291 in B-cell-mediated autoimmune diseases, including LN, ERL and ANCA-associated vasculitis, which we refer to as the GLEAM trial. The clinical trial startup activities for the GLEAM trial are currently underway, and we expect to share clinical data in 2024. In January 2024, we received IND clearance to evaluate SC262, a CD22-directed allogeneic CAR T, for the treatment of patients with relapsed and/or refractory B-cell malignancies who have received prior CD19-directed CAR T therapy, which we refer to as the VIVID trial. Clinical trial startup activities for the VIVID trial are also currently ongoing. We expect to share data from the VIVID trial in 2024. SC255, is our B-cell maturation antigen (BCMA)-directed allogeneic CAR T, for the treatment for multiple myeloma (MM). The SC255 program has completed a battery of pre-clinical tests and is currently gated based on resource availability.

Background on B-Cell Malignancies

B-cell malignancies represent a spectrum of cancers including NHL, CLL, ALL, and MM and result in over 100,000 deaths per year in the United States and Europe.

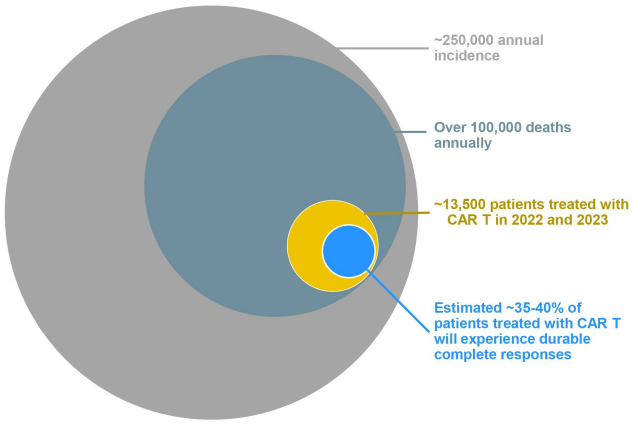
NHL is the most common cancer of the lymphatic system. NHL is not a single disease, but rather a group of several closely related cancers. Over 77,000 cases of NHL are diagnosed annually in the United States, and the most common subtype of NHL overall is diffuse large B-cell lymphoma (DLBCL). DLBCL, if left untreated, may have survival measured in weeks or months. Other common subtypes of NHL include mantle cell lymphoma (MCL), follicular lymphoma (FL), and marginal zone B-cell lymphoma (MZL).

CLL is the most common type of leukemia and occurs most frequently in older individuals, with diagnoses in people under 30 years of age occurring only rarely. Each year, approximately 20,000 patients are diagnosed with CLL in the United States. Approximately 20 to 25% of CLL patients initially present with high-risk disease. Median progression-free survival in these high-risk individuals is often less than 12 to 18 months after front-line therapy and less than 12 months in relapsed or refractory (R/R) disease.

ALL is a type of leukemia that results from an uncontrolled proliferation of lymphoblasts, which are immature white blood cells. Lymphoblasts, which are produced in the bone marrow, cause damage and death by inhibiting the production of normal cells. Approximately 6,000 patients are diagnosed with ALL in the United States each year, and the vast majority of the approximately 1,500 ALL deaths per year occur in adults. Approximately 80% of cases of ALL in the United States and Europe are B-cell ALL, which almost always involves cancer cells that express the CD19 protein. The five-year overall survival rate in ALL adults over the age of 60 is approximately 20%, and the median disease-free survival in patients with R/R ALL after two or more lines of therapy is less than six months. B-cell ALL is the most common cancer in children. Although children with ALL fare better than adults, children with R/R disease have poor outcomes. Because of the frequency of this disease, ALL remains a leading cause of death due to cancer in children.

MM is a cancer of the plasma cells, which are B-cells that have matured to specialize in the production of antibodies, and which typically express the BCMA protein. MM is a condition in which plasma cells become malignant and grow at an uncontrolled pace. These cells secrete large quantities of the same antibody, resulting in patient symptoms that result from the myeloma cells crowding out other plasma and bone marrow cells, including increased risk of infection, risk of bone destruction, and kidney disease. MM is the second most common hematologic malignancy, comprising approximately 2% of all cancers and accounting for over 34,000 new cases per year, with 12,600 deaths estimated to have occurred in 2022 in the United States.

High Mortality in Lymphoma, Leukemia and Multiple Myeloma in United States and EU5



Hematologic malignancies result in a large number of annual death across the United States and Europe. Only a small fraction of patients have durable remissions following CAR T therapy.

Current Treatment Landscape and Unmet Need

First-line therapy for NHL typically consists of multi-agent cytotoxic drugs in combination with the monoclonal antibody rituximab. In younger patients with NHL who have good organ function, high dose chemotherapy followed by stem cell transplantation is often used. Patients often relapse, however, and since 2017, several therapeutics have been approved in the United States for the treatment of patients with R/R NHL who have received prior therapies. These approved therapies include CD19 CAR T therapies tisagenlecleucel, axicabtagene ciloleucel, and lisocabtagene maraleucel, CD19 antibody drug conjugate therapy polatuzumab vedotin, and CD19 antibody tafasitamab. Recently, two autologous CD19 CAR T products have been approved in second-line patients with R/R NHL after proving to be superior to standard of care in pivotal trials, raising the possibility that CD19 CAR T cell therapies may have the potential to have a broader impact for patients with NHL.

Newly diagnosed CLL patients are often treated with targeted therapies such as BTK inhibitors, PIK3 inhibitors, BCL-2 inhibitors, or monoclonal antibodies targeting CD20 or CD52 in combination with chemotherapy. However, most patients treated with these regimens become refractory. Numerous drug candidates, including next-generation kinase inhibitors, are in clinical development for refractory patients. Autologous CD19 CAR T cell therapies are also beginning to progress through clinical trials, with a recent Phase 1/2 study in R/R CLL reporting that it had met its primary endpoint of complete response.

Cure rates for ALL patients have continued to increase over the last four decades, with pediatric ALL cure rates reaching greater than 80% in developed countries. This progress has been enabled by advances in combination chemotherapy, monitoring of minimal residual disease, expanded use of kinase inhibitors for Philadelphia chromosome-positive ALL, and the recent approval of Kymriah® for R/R pediatric ALL. Adult patients fare much worse, however, with 5-year overall survival rates of approximately 20%, and there are still significant challenges managing R/R disease across all age groups. Multiple therapeutic candidates are in development for R/R patients, including proteasome inhibitors, antimetabolites, JAK inhibitors, and monoclonal antibodies, as well as autologous and allogeneic CAR T candidates.

There are no curative treatment options for MM patients. First-line therapy for MM consists of induction therapy and high-dose chemotherapy followed by a potential stem cell transplant, and the standard of care for R/R MM includes immunomodulatory agents, proteasome inhibitors, monoclonal antibodies, cytotoxic agents, and hematopoietic stem cell transplant. Despite the recent advancement in available therapies for MM disease management, the five-year overall survival rate remains at approximately 50%. Given this significant unmet need, several groups are investigating autologous and allogeneic CAR T cell therapies for R/R MM. BCMA is among the most promising antigens used to target MM, with two BCMA CAR T therapies (idecabtagene vicleucel and ciltacabtagene autoleucel) having received marketing approval in late-line R/R MM. Recently, both drugs have been used to dose patients in pivotal clinical studies for patients with R/R MM in earlier lines of therapy, where they outperformed standard of care. Novel treatments with other mechanisms of action are also undergoing development, including bispecific T cell engagers, next-generation antibodies, and antibody drug conjugates.

As highlighted above, recent therapeutic advances across R/R B-cell malignancies have led to a variety of treatment options and better patient outcomes. In particular, autologous surface protein-directed CAR T therapies have been highly effective in certain subsets of patients with R/R disease. However, not all patients have access to these novel therapies, and even if they able to obtain such access, many patients ultimately relapse following treatment and succumb to their cancer, resulting in 100,000 deaths per year in the United States and Europe across these indications.

There are two primary outstanding challenges that have limited utilization of these CAR T therapies and their impact on broader groups of patients: relapse and manufacturing challenges.

Lack of Response / Relapse. Only about 50% of patients treated with an approved CD19-directed CAR T therapy will have a complete response and approximately one-third of patients with a complete response will relapse relatively quickly. The emerging post-approval data from approved CAR T therapies tisagenlecleucel, axicabtagene ciloleucel and lisocabtagene maraleucel indicate that relapse can result from one of two primary factors.

1) The first involves loss of CD19 expression on malignant cells, resulting in tumor escape. This finding was initially established for ALL and is the cause of relapse after CAR T treatment for roughly half of treated patients. More recent data indicate that low CD19 expression contributes to the lack of response in a meaningful number of patients with NHL. CD19 CAR T treatments have recently been tested in pivotal trials in earlier lines of therapy for NHL, which raises the possibility that more patients will be treated with CD19 CAR T therapy and subsequently relapse due to CD19 loss. Patients with CD19 therapy failure have an extremely poor prognosis, with overall survival measurable in months and virtually no treatment options. Therefore, the development of CAR T therapies targeting an alternate antigen other than CD19 may provide an opportunity to address this growing unmet need. Data from several studies have shown that CD22 CAR T treatment has led to complete responses in NHL and ALL patients that failed to reach a complete response or relapsed after CD19 CAR T treatment.

2) The second pattern of relapse relates to suboptimal CAR T cell functionality, such as poor expansion, poor persistence, or T cell exhaustion, resulting in relapse and continued growth of cancer cells that retain the targeted antigen. Re-infusion with the same CAR T therapy has had limited benefit in these patients, although treatment with a different CAR T therapy has demonstrated some promise in ongoing clinical trials.

Manufacturing. Because autologous CAR T therapies are patient-specific products, their manufacturing process is complex and requires a significant amount of resources, including time and labor. Given this, infrastructure and cost considerations and limitations have resulted in limited patient access to these therapies. Even for patients who are fortunate enough to have access to approved CAR T therapies, delays, commonly of at least one month, resulting from scheduling difficulties and issues that arise during manufacturing may prevent use of and the utility of these therapies in patients with rapidly progressing malignancies. Certain groups are seeking to overcome access limitations by using healthy donor-derived, or allogeneic, CAR T cells instead of patient T cells to yield “off-the-shelf” therapeutics that can be manufactured consistently. However, efficacy and durability concerns remain, largely due to the inability to effectively control the HvGR response and the risk of eventual immune rejection of these products by the recipient. We are developing our *ex vivo* allogeneic T cell programs to address this HvGR and prevent immune rejection.

Background on B-Cell-Mediated Autoimmune Disease

Autoimmune diseases arise from immune system dysfunction whereby the body’s immune cells mistakenly attack healthy cells and tissues in the body. These diseases are typically characterized by defects in the adaptive immune response involving B-cells and/or T cells. These diseases can manifest across multiple organ systems and lead to a decreased quality of life or even severe disability in patients. B-cell depletion has been shown to provide clinical benefit in autoimmune disorders mediated by dysfunctional B-cells, including SLE, systemic sclerosis, myositis, MS, ANCA-associated vasculitis, and others. Collectively, these diseases afflict more than 5 million patients in the United States alone.

SLE is a chronic autoimmune disease that predominantly affects women of childbearing age. Immunologic abnormalities, especially the production of antinuclear antibodies (ANA), are a prominent feature of the disease. The exact cause of SLE remains unclear, but it is thought to result from a combination of genetic predisposition and environmental triggers. SLE presents with a wide range of clinical signs and symptoms, as well as serologic findings, and can affect multiple organ systems. SLE has a prevalence of approximately 400,000 across the United States, EU5, and Japan. About 60% of SLE patients are diagnosed with LN after clinical indication of kidney involvement. The remainder are classified as having extrarenal lupus. The renal complications are detected through an abnormal urinalysis arising during the disease course. LN is one of the most severe complications of SLE, in which autoantibodies cause damage to the glomerular structures in the kidney, which can result in end-stage renal disease (ESRD). Patients with ESRD have a 5-year survival rate of 50%.

ANCA-associated vasculitis is a group of diseases characterized by loss of immunological tolerance to neutrophil protein, which causes inflammation of small blood vessels. The primary clinical manifestations of the disease occur in the upper respiratory tract, in the kidneys, or as asthma. The cause of ANCA-associated vasculitis is not fully understood and believed to be in part due to genetic susceptibility and environmental triggers. There are about 60,000 ANCA-associated vasculitis patients in the United States. Left untreated, ANCA-associated vasculitis is associated with significant morbidity, but with proper treatment, the 5-year survival rate ranges from 80% to 90%.

Current Treatment Landscape and Unmet Need

Currently, there is no standard of care treatment for achieving drug-free remission in LN patients; therefore, patients often require life-long therapy. While a combination approach using antimalarials (hydroxychloroquine), systemic steroids, and conventional immunosuppressant medicines (such as azathioprine (AZA), Mycophenolate mofetil (MMF), and cyclophosphamide) are first-line options, a significant proportion of patients continue to have high disease activity and recurrent relapses despite therapy. Rituximab, initially approved by the FDA in 1997 for the treatment of R/R NHL, is a monoclonal antibody (mAb) that selectively targets the B-cell specific surface molecule CD20. The LUNAR trial of rituximab failed to meet the primary endpoint of complete renal response after treatment with rituximab, although the trial demonstrated partial responses in selected patients. Complete peripheral depletion of B-cells with rituximab was not observed in all participants, and even in participants where complete peripheral depletion of B-cells was observed, less than 50% achieved complete response. A retrospective analysis of these data demonstrated that deeper B-cell depletion was associated with improved complete renal responses, and that poor tissue B-cell depletion was associated with non-response. The continued persistence of autoreactive B-cells in protected microenvironments, such as the lymphoid germinal center structures, correlated with the partial success of this approach in LN. Treatments for ERL include low intensity therapies such as low-dose corticosteroids, antimalarials, and NSAIDS. Based on worsening disease manifestations, additional immunosuppression medications can include high dose prednisone, methotrexate (MTX), AZA, and MMF, which are known to have side effects and increase the risk of significant infection. The pivotal trial of the anti-BAFF mAb belimumab in these patients demonstrated a clinically meaningful improvement in patient outcomes in a large trial that enabled the first FDA drug approval for the treatment adult patients with SLE. Although this large trial demonstrated a reduction of disease activity compared to placebo control, approximately 20% in all groups still experienced a severe disease flare. Anifrolumab, a mAb targeting the interferon alfa signature known to be elevated in SLE patients, was approved by the FDA in 2021 for the treatment of adult patients with SLE. Only 15% of the patients met the criteria for remission at 52 weeks, highlighting the unmet need in patients. Since the 1970s, cyclophosphamide has been the standard of care therapy for ANCA-associated vasculitis, demonstrating a survival benefit compared to corticosteroids alone. However, the dose-limiting toxicity of cyclophosphamide results in treatment failure and risk of chronic relapse. Rituximab was approved for this indication based on a clinical trial in which it was shown to be non-inferior to cyclophosphamide for remission (at six months), supporting the role of B-cell depletion in the treatment of these patients. A complement C5a receptor, avacopan, was recently approved in this indication. Despite this recent success and FDA and European Medicines Agency approval, 35-45% of patients do not achieve remission of disease at one year with these new therapies. There is strong evidence to suggest that B-cell depletion with CD19-directed CAR T cell therapy is feasible and highly effective in patients with SLE. In a study published in 2022 from Germany, five SLE patients between 18 and 24 years of age were treated with autologous CD19-directed CAR T cell therapy. These SLE patients had multiorgan involvement and were refractory to a variety of immunosuppressive drug treatments. After lymphodepleting chemotherapy with fludarabine and cyclophosphamide, autologous CD19-directed CAR T cells were administered as a single intravenous infusion. Full depletion of B-cells was observed from peripheral blood in all patients from Day 2 following CAR T cell infusion, resulting in an improvement in clinical symptoms and evidence of decline of ANAs. These data suggest that CD19-directed CAR T cell therapy induces deep B-cell depletion in tissues such as lymph nodes and highlights a key advantage in the use of CD19-directed CAR T cell therapy compared to antibody-mediated B-cell depletion. All patients achieved remission status by three months, with drug-free remission maintained over a median of eight months. B-cells did reappear in these patients after approximately 110 days; however, these B-cells were naïve and showed non-class-switched B-cell receptors, suggesting elimination of B-cell subsets generating autoantibodies and a reset of the B-cell repertoire. Despite the reconstitution of B-cells, patients did not experience flares of SLE or need additional immunosuppressive medication, indicating the achievement of drug-free remission. As of December 2023, the drug-free clinical remission in the first patient continues almost three years following CAR T treatment. Previous studies using CD19-directed CAR T cell therapy in lymphoma and leukemia have reported CRS and ICANS occurring frequently after treatment. However, the five SLE patients receiving CAR T cell therapy had either no reported CRS or only Grade 1 CRS. None of these five patients developed ICANS, indicating low therapy-related toxicity with CAR T cell treatment in these patients. As of ASH 2023, this group had treated a total of fifteen patients across three B-cell mediated autoimmune diseases, namely SLE, Idiopathic Inflammatory Myositis and Systemic Sclerosis. Clinical remission was reported across all patients and CAR T treatment was well tolerated without the need for further immunosuppression. The first patient (treated for SLE) continued to be in remission beyond 800 days.

In the ongoing ARDENT trial, we have observed the pharmacodynamic effect of peripheral blood B-cell depletion, which refers to diminishing B-cell counts in the peripheral blood, associated with SC291 treatment in patients. While pharmacodynamic effects seen in oncology patients may not translate to patients with autoimmune disease, we believe these data increase the probability that SC291 treatment confers similar B-cell depletion, the putative mechanism of benefit, to patients with B-cell-mediated autoimmune disorder.

Limitations of Allogeneic CAR T Therapies

We believe our hypoimmune cells have the potential to create a differentiated platform for developing allogeneic T cells, and to address two major hurdles associated with use of allogeneic T cells. The first is the risk of GvHD, in which the allogeneic donor T cells target and kill recipient tissues. Multiple CAR T cell product candidates in clinical development have prevented this reaction through gene edits targeting components of the T cell receptor, such as TCR-alpha gene. The more significant challenge has been HvGR, in which the patient's immune system kills the transplanted T cells. One strategy to address this challenge has been to essentially eliminate the patient's immune system, neutering its ability to find and destroy the transplanted allogeneic CAR T cells. However, this strategy has two limitations. First, the patient is at risk for developing severe infections during this period of substantial immune suppression. Second, as the immune system returns following immune suppression, it will inevitably reject the allogeneic CAR T cells, limiting their persistence, or the duration that these therapeutic cells are in the body. In multiple independent clinical trials, regardless of the disease setting, allogeneic CAR T cells have been shown to be cleared from the patient immune system in less than a month despite high dose immunosuppression. The therapy recipients often experience short lived clinical responses with the lack of durability correlating with the poor persistence of the allogeneic cells. Conversely, the clinical experience with autologous CAR T cells has demonstrated that longer persistence of the CAR T correlates with durable cancer remission. Thus, the ability to effectively prevent long-term rejection of an allogeneic CAR T therapy without significant immune suppression would provide a significant advantage over existing allogeneic approaches. We are aware of other efforts to develop allogeneic CAR T cell products that focus on overcoming the adaptive immune system, consisting of T and B-cells. However, our hypoimmune technology addresses rejection mediated by both the adaptive and innate immune systems, which we believe will enable us to create a differentiated allogeneic CAR T solution.

Our Allogeneic T Cell Approach

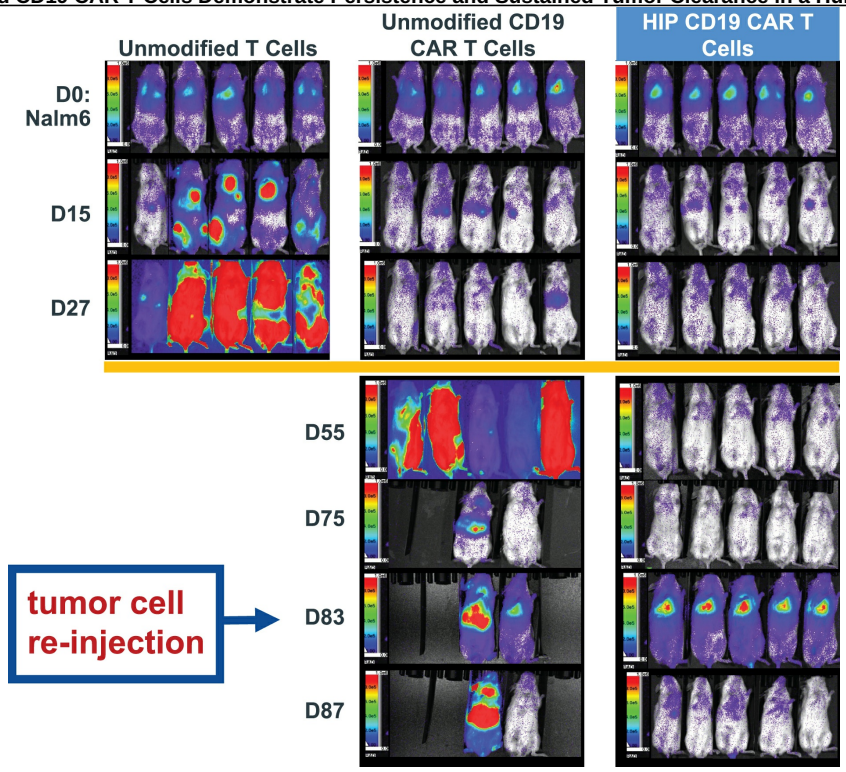
Our hypoimmune technology is designed to "hide" the cell from the patient's immune system, and we are applying this technology for the clinical development of hypoimmune allogeneic CAR T cells for a variety of therapeutic applications. Our allogeneic T cell platform is designed to enable the substitution of CAR constructs in a modular fashion. Initial clinical success with SC291 would support the expansion of our allogeneic CAR T efforts and enable additional product candidates to be brought forward and developed. We are prioritizing clinically-validated cancer antigens as well as CAR constructs that have shown robust safety and efficacy profiles in hematologic malignancies in the autologous context.

Our manufacturing process begins with T cells from healthy donors, into which we introduce the CAR gene, make the gene modifications necessary to avoid GvHD, and incorporate our hypoimmune modifications to prevent host versus graft disease. We then expand these cells *ex vivo*, which enables us to both make many batches from a single T cell donor as well as create comparable CAR T cells derived from different donors. Our vision is to freeze these allogeneic CAR T therapies, store them, and deliver them to cancer patients as an "off the shelf" product without requiring severe immunosuppression.

Preclinical Data

For our preclinical studies, human donor T cells were genetically modified *ex vivo* to generate T cells with hypoimmune modifications (disruption of MHC class I/class II; overexpression of CD47), TCR-alpha disruption (to mitigate GvHD), and the expression of a CD19 CAR. These cells, as well as unmodified CD19 CAR T cells, were then tested *in vivo* for their tumor-killing activity in a human xenograft mouse model for leukemia (Nalm-6). These preclinical data suggest that the hypoimmune modifications do not interfere with CAR T killing activity. We observed initial clearance of the leukemic cells by both the hypoimmune CD19 CAR T cells and the unmodified CD19 CAR T cells, which are similar to CAR T cells currently in clinical use. However, the unmodified CD19 CAR T cells were eventually rejected by the host immune system, and tumor regrowth began after about two months. By contrast, in hypoimmune CD19 CAR T injected mice, tumor control was maintained throughout the study, including following a rechallenge at day 83 with Nalm-6 leukemia cells, without further administration of hypoimmune CD19 CAR T cells. Analysis of immune cells from the bone marrow and spleen at the study endpoint confirmed persistence of the hypoimmune CD19 CAR T cells.

Hypoimmune Donor-Derived CD19 CAR T Cells Demonstrate Persistence and Sustained Tumor Clearance in a Human Xenograft Mouse Model



Activity of hypoimmune donor-derived CD19 CAR T in a mouse leukemia xenograft model (Nalm-6). When compared to untreated controls, infusion of unmodified CD19 CAR T or hypoimmune CD19 CAR T results in eradication of leukemia cells. Tumor regrowth was visible in animals treated with unmodified CD19 CAR T cells by Day 57; by contrast, hypoimmune CD19 CAR T-treated animals remained tumor free. Leukemia tumor cells were reinjected into both sets of animals at Day 83 and markedly greater tumor clearance was seen in the hypoimmune CD19 CAR T-treated animals. Note: Animals were not retreated with CAR T cells after initial dosing.

Furthermore, the absence of adaptive or innate immune system activation by hypoimmune CD19 CAR T cells in the humanized mice was confirmed *in vitro.*

Clinical Data

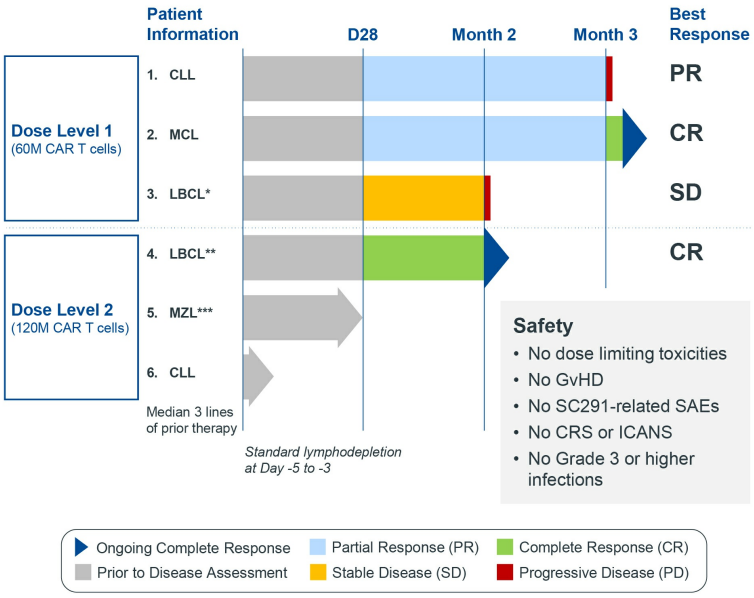
In January 2024, we disclosed initial interim clinical data from the ongoing ARDENT trial. Results of our early interim analysis of clinical safety and other clinical responses are discussed above under “Overview.”

Analysis of Patient Immune Responses to SC291

The SC291 drug product contains CAR T cells that are fully edited hypoimmune cells, which we describe as HIP-edited CAR-T cells, along with partially edited cells, which we describe as non-HIP CAR T cells. *In vitro* testing showed evidence that blood and immune cells from each of the four evaluable patients had mounted an immune response to the non-HIP CAR T cells but not to the HIP-edited CAR T cells. Specifically, HIP-edited CAR T cells from the drug product were not rejected by the innate immune response mediated by the patient’s NK cells, nor did the patients have T cell or antibody responses that recognized these cells. In contrast, we observed immune responses against the non-HIP CAR T cells in the drug product.

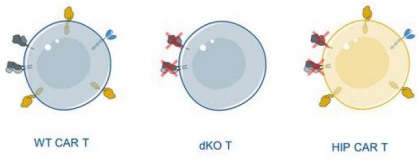
Importantly, this evidence suggests that the patients had an intact immune system capable of recognizing allogeneic cells and that the HIP CAR T cells were able to evade these responses. These results were consistent across all four evaluable patients and provide early support for the idea that the immune evasion profile of our HIP gene edits in multiple pre-clinical models may translate into human subjects. We believe this observation supports further dose escalation and dose expansion in the ARDENT trial and broader application of our HIP technology in allogeneic cell therapies in other indications.

Initial Clinical Safety and Efficacy of SC291 in ARDENT Clinical Trial



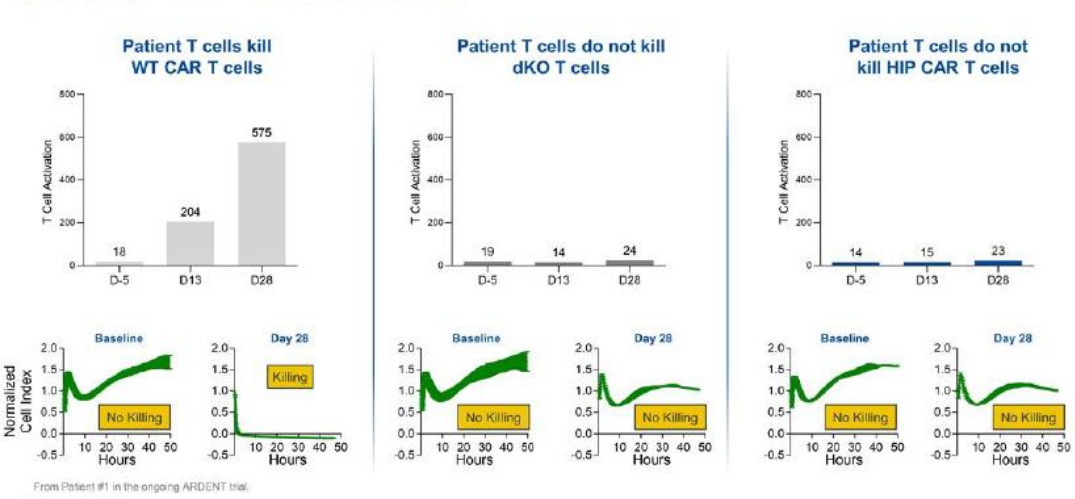
Clinical data as of: January 5, 2024
"evaluable" defined as patients treated with SC291 and had at least one disease assessment
*Transformed DLBCL from FL. **Transformed DLBCL from MZL. ***Assessment ongoing as of January 5,2024.

SC291 is a Mixture of T cell Subpopulations Including HIP and Non-HIP CAR T Cells



T Cell Population	Genetic Modifications
WT CAR T	CD47-CD19 CAR
dKO T	HLA I/II deficient
HIP CAR T	CD47-CD19 CAR; HLA I/II deficient

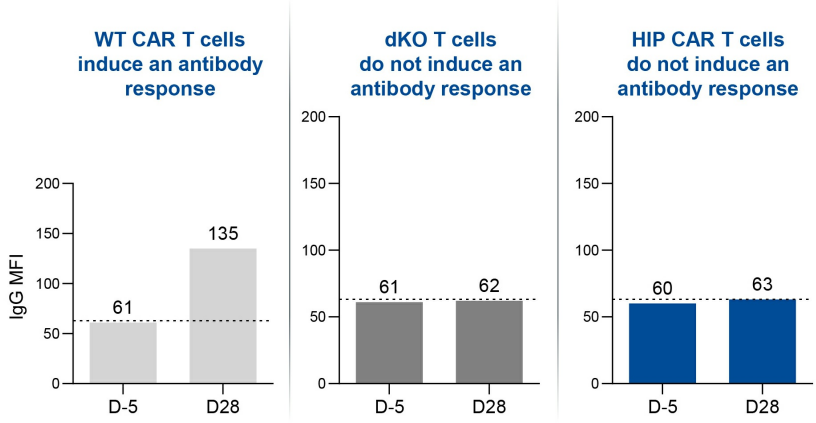
Patient T cells Kill WT CAR T Cells But Do Not Kill DKO T cells or HIP CAR T Cells



Upper panel: T cells from a patient receiving SC291 showed no activation when exposed to HIP CAR T (CD47-CD19 CAR; HLAI/II deficient) cells from SC291 drug product in vitro. Patient T cells were collected 5 days prior to SC291 infusion (D-5) and at Day 13 (D13) and Day 28 (D28) after SC291 infusion. Robust patient T cell activation was detected versus WT CAR T cells (CD47-CD19 CAR) from SC291 drug product in vitro. In contrast, no T cell activation was seen versus dKO T cells (HLA I/II deficient cells) and HIP CAR T cells from SC291 drug product in vitro.

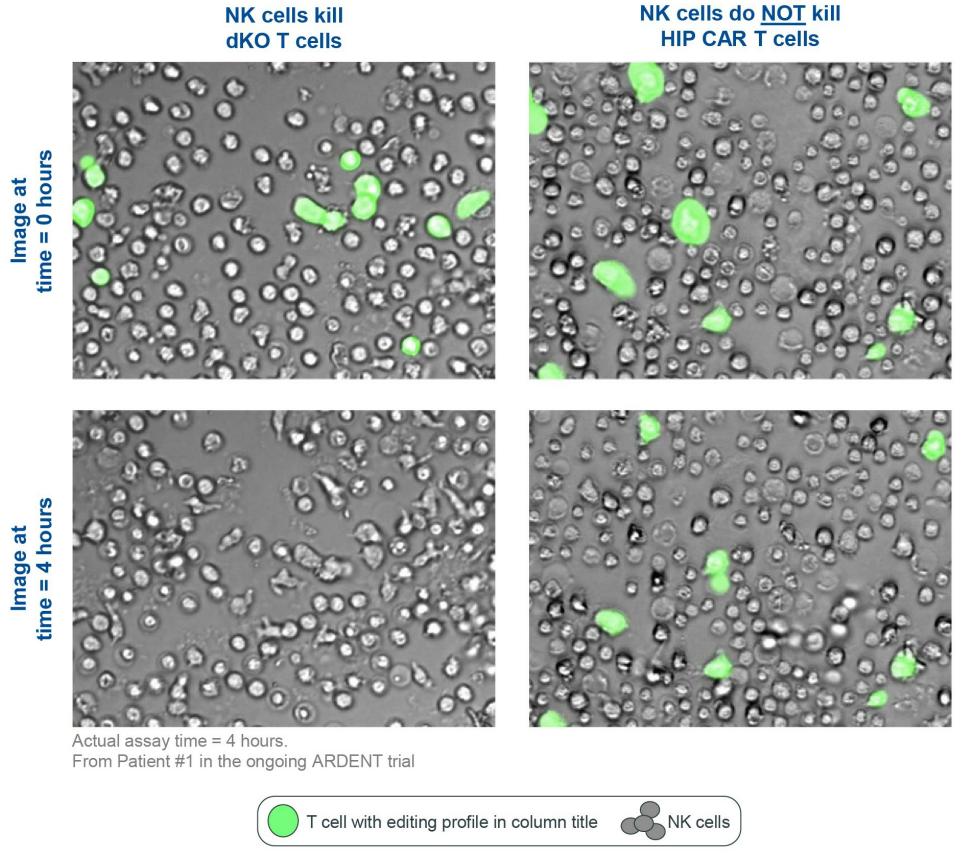
Lower panel: T cells from a patient receiving SC291 showed no killing of HIP CAR T cells in SC291 drug product in vitro. Patient T cells were collected 5 days prior to SC291 infusion (D-5) and Day 28 (D28) after SC291 infusion. Robust patient T cell-mediated killing was detected versus WT CAR T cells and dKO T cells from SC291 drug product in vitro. In contrast, no patient T cell-mediated killing was seen versus HIP CAR T cells in SC291 drug product in vitro.

Patient Generates Antibodies Against WT CAR T Cells But Not DKO T Cells or HIP CAR T Cells



Patient receiving SC291 generated an antibody response to WT CAR T cells, but not to dKO T cells or HIP CAR T cells. Antibody response was assessed from patient sample collected 5 days prior to SC291 infusion (D-5) and at Day 28 (D28) after SC291 infusion. Antibody production was measured by quantifying the binding of IgG to WT CAR T cells, dKO T cells, and HIP CAR T cells purified from the SC291 drug product.

Only HIP CAR T Cells Evade Patient NK Cell Killing



NK cells from a patient receiving SC291 kill dKO T cells but not HIP CAR T cells. Patient NK cells were isolated at Day 13 after SC291 infusion. An in vitro NK-cell mediated cell killing assay was performed over a four-hour period with fluorescent labelled dKO T cells or HIP CAR T cells. Patient NK cells rapidly killed the dKO T cells as evidenced by the extinction of the GFP signal. In contrast, patient NK cells did not kill HIP CAR T cells.

Development Plan and Key Next Steps

We believe the initial ARDENT safety and clinical data described above support continued dose escalation and expansion within the trial to treat additional patients and monitor outcomes over longer periods of time. We expect to share additional data from the ARDENT trial in 2024. We also expect to report progress on the GLEAM trial, in which we are evaluating SC291 in LN, ERL, and ANCA-associated vasculitis. The potential for B-cell depletion with SC291, as seen in ARDENT, may provide clinical benefit to patients with B-cell-mediated autoimmune disease. We also plan to share data from our VIVID trial, in which we are evaluating SC262 (hypoimmune-modified CD22 CAR T) in patients with relapsed and/or refractory B-cell malignancies who have received prior CD19-directed CAR T therapy. We are also advancing our SC255 allogeneic T cell program targeting BCMA for MM. The SC255 program has completed a battery of pre-clinical tests and is currently gated based on resource availability.

Pancreatic Islet Cell Program

Our pancreatic islet cell product candidate, SC451, is a hypoimmune PSC-derived pancreatic islet cell product candidate that aims to restore glucose control in T1DM patients by transplantation into these patients without the need for immunosuppression. Current therapies for T1DM require continual management, and we believe that effectively restoring islet cell functionality will meaningfully improve outcomes for T1DM patients, which is supported by data from T1DM patients who have successfully received primary islet transplants with immunosuppression. We are currently engaged in preclinical activities for SC451.

In November 2023, the Swedish Medical Products Agency authorized Uppsala University Hospital's a CTA for the IST, a first-in-human study evaluating UP421, an allogeneic, primary islet cell therapy engineered with our HIP technology, in patients with T1DM. Patients in this study will receive no immunosuppression. We believe that immunology insights gained from the IST, particularly with respect to whether HIP modifications lead to long-term survival and evasion of either allogeneic or autoimmune killing of the transplanted cells, may provide direct insights applicable to our SC451 program. We expect data from the IST to be shared in 2024.

Background on Type 1 Diabetes Mellitus

T1DM is an autoimmune disease in which the patient's immune system destroys its own pancreatic islet cells. The destruction of these cells leads to complete loss of insulin production and a metabolic disease wherein patients are unable to control their blood glucose levels. Often called "juvenile diabetes," T1DM disease onset commonly occurs in adolescence. Beta cells reside in specialized hormone-producing clusters within the pancreas called the islets of Langerhans. In T1DM, activated T lymphocytes infiltrate the islets and selectively kill the beta cells, progressively reducing the body's capacity to produce insulin. Once the reserve capacity of beta cells is exhausted, blood glucose rises, and the patient will have a lifelong battle to control blood glucose levels. Without insulin therapy, T1DM is rapidly fatal. T1DM current affects more than eight million patients worldwide.

Current Treatment Landscape and Unmet Need

Insulin injection is the main treatment option for T1DM. Despite significant advances in types of insulins, glucose monitoring, and insulin pumps, life expectancy for T1DM is still approximately 15 years shorter than for people without diabetes. Patients are at risk of acute complications of hyperglycemia, including diabetic ketoacidosis, coma, and death, as well as hypoglycemic episodes, particularly at night, which can lead to the "dead in bed" syndrome, thought to result from cardiac arrhythmias induced by low glucose. Long term elevations in blood glucose levels can have particularly devastating effects on arteries and capillaries, resulting in premature myocardial infarction, stroke, limb ischemia, gangrene, kidney failure, and blindness due to diabetic retinopathy. "Insulin pumps," which feature a computerized system for sensing blood glucose and delivering appropriate doses of insulin, have improved glycemic control, though data from the FDA indicate that issues with insulin pumps are among the most frequently reported problems in their database. All current therapies require patients to carefully monitor their dietary intake, which, although inconvenient in adults, is a frequent point of failure in adolescents.

Pancreas transplantation for uncontrollable diabetes was first performed in the 1960s and established the principle that replacing the beta cells (here, in the context of the entire pancreas) could restore physiological glucose control. Pancreas transplants are complicated surgical interventions, require lifelong immunosuppression, and are limited due to organ availability. Nevertheless, some 30,000 pancreas transplants have been performed worldwide to date.

Because of these challenges, the biomedical community began exploring pancreatic islet transplantation in the 1970s. This process requires enzymatic digestion of a donor pancreas and isolation of the islets of Langerhans, followed by delivery of these cells to an appropriate site in the body where the islets can engraft and become well-vascularized. The major lessons from islet transplantation have been that glucose homeostasis can be restored, insulin independence can be achieved, levels of hemoglobin A1C (a marker of long-term glucose levels) can be normalized, severe episodes of hypoglycemia can be reduced, and the pathology associated with long-term hyperglycemia can halt or even reverse. As with an organ transplant, patients must undergo chronic immune suppression to prevent immune rejection of the transplanted cells. Most patients lose glucose control over a period of months to years and eventually become insulin-dependent again, primarily due to immune rejection of the allogeneic islets resulting from an inability to tolerate the significant immune suppression necessary to protect the cell transplant.

Our Pancreatic Islet Cell Program Approach

The goal of our SC451 program is to restore glucose control in T1DM patients by transplanting hypoimmune PSC-derived islet cells, including beta cells, without the need for immunosuppression, giving patients physiologically appropriate glucose sensing and insulin secretion. We believe this therapy could reduce, or even eliminate, hypoglycemia and hyperglycemia in T1DM patients, potentially enabling less onerous and costly treatment, fewer complications, a meaningfully improved quality of life, and longer life expectancy.

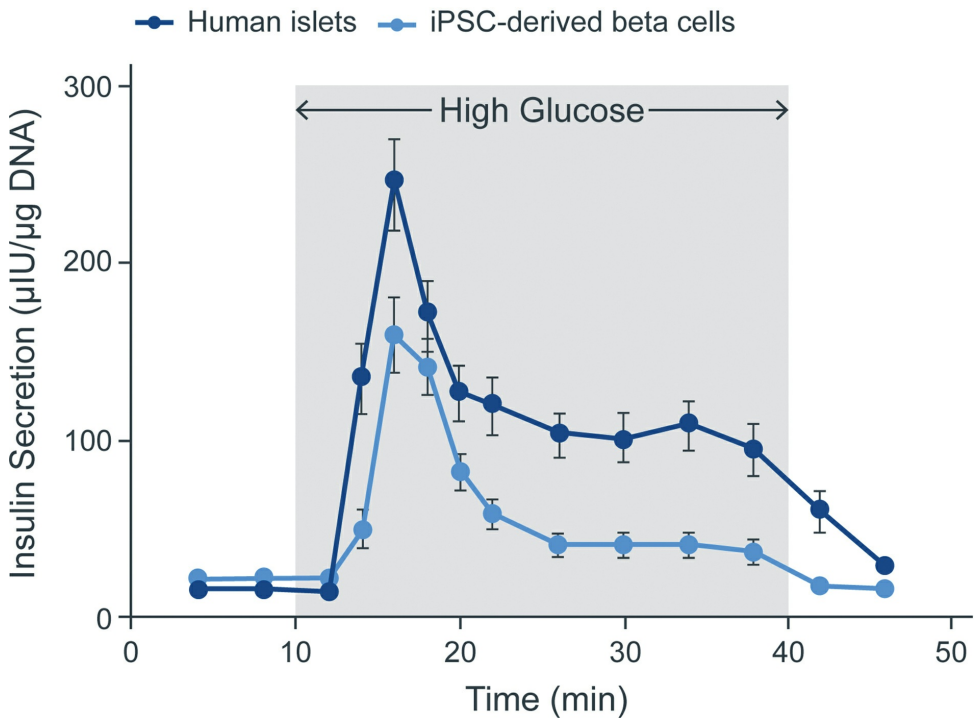
We focus our efforts around three goals: (i) deriving highly functional islet cells from PSCs, (ii) using our hypoimmune technology to genetically modify these cells to evade allogeneic immune responses, and (iii) using our hypoimmune technology to genetically modify these cells to evade autoimmune destruction of islet cells. This strategy requires building on lessons from pancreatic islet transplantation, recent advances in understanding pancreatic islet developmental biology, and our hypoimmune technology.

Deriving islet cells from PSCs has the potential to solve limitations associated with use of a donor pancreas and improve the overall product quality and product consistency. PSCs have the potential to create a virtually limitless supply of these cells. Our program uses proprietary differentiation protocols to generate mature islet cells with glucose control comparable to primary human islets, as evidenced by our animal studies. Finally, we are applying our hypoimmune technology to modify the genomes of the PSCs. If successful, the hypoimmune genome modifications will protect these PSC-derived islet cells from both autoimmune and allogeneic rejection by the patient's immune system and potentially remove the need for toxic immunosuppression in transplant recipients. Hypoimmunity also eliminates the need for physical separation of the islet cells from the rest of the body by a device or encapsulation technology, which may allow for tighter glucose control by eliminating the lag time between glucose sensing and insulin secretion as well as avoiding the fibrotic reaction inherent in encapsulation technologies to date.

Preclinical Data

We are developing a proprietary protocol to differentiate hypoimmune PSCs into mature, glucose-sensitive, insulin-secreting islet cells. We are exploring ways to optimize the differentiation of islet cells at a greater purity and with superior function compared to published stem cell-based protocols. The principal function of beta islet cells, the insulin-secreting cells within an islet, is to maintain steady levels of glucose in circulation. The beta islet cells sense when glucose levels rise in the bloodstream and release insulin in response. *In vitro*, we have observed that our PSC-derived islet populations can respond to glucose and secrete insulin.

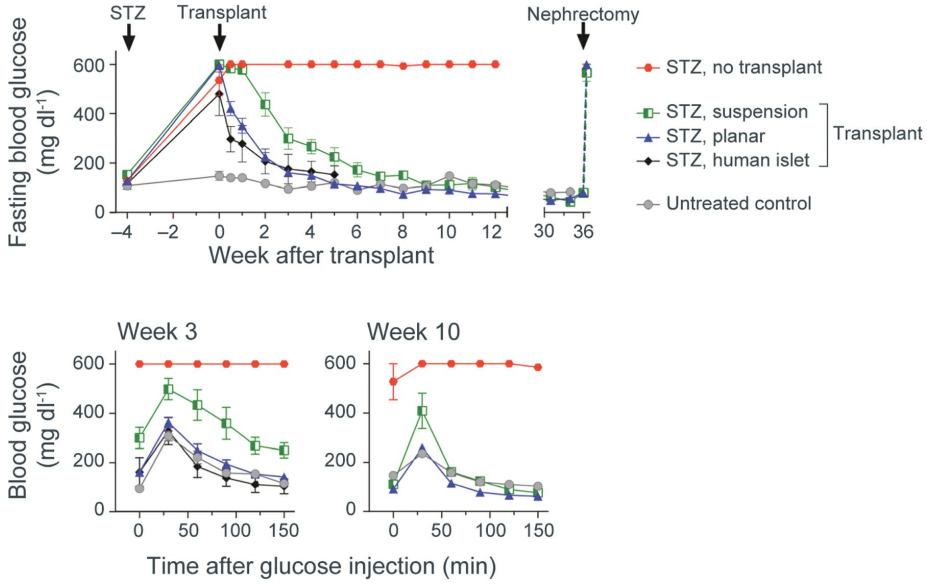
Human PSC-Derived Islet Cells Exhibit Glucose-Induced Insulin Release



Human islets from cadaveric pancreases exhibit robust insulin secretion in response to an increase in glucose levels. Human PSC-derived islet cells using technology licensed from Washington University demonstrate similar levels of insulin secretion as the cadaveric islets.

These PSC-derived islet cells were tested in a mouse model of T1DM induced by the beta cell toxin, STZ. When transplanted into the kidney of the T1DM mice, these islet cells normalize glucose levels in an equivalent fashion to primary human islets. The diabetic glucose levels return when the grafts are surgically excised via nephrectomy. Similar to the human phenotype, T1DM mice cannot normalize circulating glucose levels following a glucose injection. Following transplantation of our islet cells, these mice rapidly normalized blood glucose in an equivalent fashion to both non-T1DM mice and T1DM mice that received human primary islet transplants.

***In vivo* Performance of iPSC-Derived Islet Cells in a Mouse Model of T1DM**



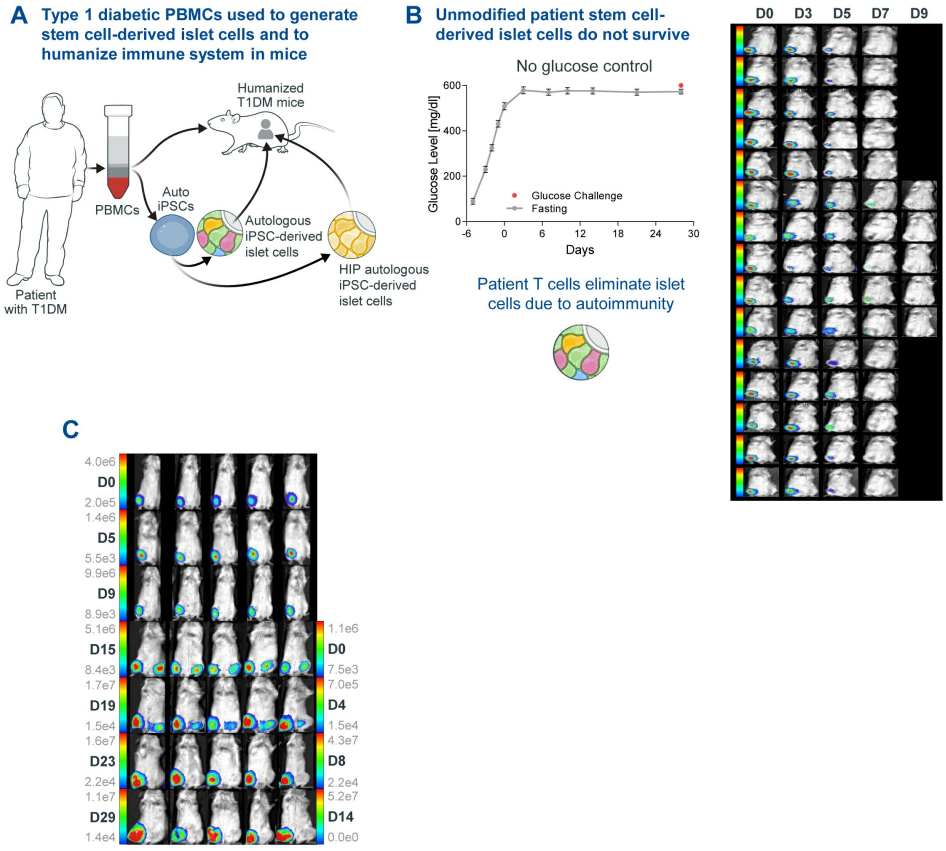
Top panel: Normalization of blood glucose levels after transplantation of cadaveric human islet cells or PSC-derived islet cells obtained by planar or suspension differentiation (based on Washington University technology). Note the rapid normalization of blood glucose with cadaveric and PSC-derived islets with the planar protocol, with slower normalization using the suspension protocol. In all groups, removal of the graft by nephrectomy re-induced diabetes, indicating the correction resulted from the transplant. STZ is a toxin for beta islet cells that induces diabetes in animal models. Bottom panel: Normalization of blood glucose after glucose injection by transplantation of cadaveric islet cells or PSC-derived islet cells. Note the more complete normalization using the planar protocol. Groups are defined by the same symbols shown in the top panel. From Hogrebe et al, Nature Biotechnology 2020.

We next tested whether hypoimmune modifications to iPSC-derived islet cells can enable evasion of autoimmune rejection. We approached this question in two ways.

First, we carried out transplantation experiments in the non-obese diabetic (NOD) mouse model, which develops spontaneous T1DM due to induction of autoantibodies and autoreactive T cells that kill the islet cells. We isolated islets from pre-diabetic NOD mice and applied hypoimmune technology to these islets to generate hypoimmune NOD islet cells, which we transplanted into diabetic NOD mice. When transplanted into NOD mice, unmodified NOD islet cells were rejected within approximately two weeks and had no impact on the diabetes. By contrast, the hypoimmune NOD islet cells survived and achieved durable glycemic control within two weeks.

In a second set of experiments, we tested whether we would observe similar findings in a human T1DM model. Because a T1DM patient has no functioning islets, we used iPSC technology to generate islet cells with the same genetic makeup as the patient. To accomplish this, we reprogrammed immune cells from a T1DM patient donor into iPSCs. We then split the iPSCs into two groups – one group to which we applied hypoimmune modifications and one that remained unmodified – before differentiating these cells into islet cells using our differentiation protocol. The end result was two different cell products for testing – (i) hypoimmune iPSC-derived islet cells and (ii) unmodified iPSC-derived islet cells. To simulate the immune environment of a T1DM patient, we developed a proprietary humanized mouse model (T1D mice) which is populated with immune cells from the same T1DM patient donor and subsequently in which diabetes is induced via STZ. Unmodified iPSC-derived islet cells injected intramuscularly into T1D mice were rejected within nine days without any impact on the T1D mice's diabetes. By contrast, hypoimmune iPSC-derived islet cells survived in T1D mice and resulted in glucose control within two weeks. To confirm that the autoimmune rejection remained intact in these mice, we tested the impact of a subsequent injection of iPSC-derived islet cells in these mice that had already been injected with hypoimmune iPSC-derived islet cells. We found that, although the iPSC-derived islet cells were rapidly rejected, the hypoimmune iPSC-derived islet cells and the glucose control were preserved. Together, these data support the belief that our hypoimmune modifications can enable evasion of autoimmune rejection.

Autologous Pancreatic Islet Experiment



A, Experimental schema for generating a humanized T1D mouse and autologous iPSCs from T1D patient PBMCs. T1D patient PBMCs were used to generate iPSCs, which were used to generate unmodified and hypoimmune autologous islet cell. B, Unmodified iPSC-derived autologous islets are cleared by the immune system of the humanized T1D mouse by Day 7 and did not restore glycemic control C, Hypoimmune iPSC-derived autologous islets (injected on left side of mouse) survive for duration of experiment (until Day 29) while unmodified iPSC-derived autologous islets (injected on right side of mouse at Day 15 post hypoimmune iPSC-derived autologous islet injection) are cleared within a week of injection.

Development Plan and Key Next Steps

In November 2023, the Swedish Medical Products Agency authorized Uppsala University Hospital's clinical trial application for the IST, a first-in-human study evaluating UP421, an allogeneic, primary islet cell therapy engineered with our HIP technology, in patients with T1DM. Allogeneic primary islet cell transplantation into T1DM patients has been shown to reduce long-term exogenous insulin dependence when administered with immunosuppression. Subjects in this study will receive no immunosuppression. We expect that data from the IST, particularly with respect to whether HIP modifications lead to long-term survival and evasion of either allogeneic or autoimmune killing of the transplanted cells, will provide insight into the impact of HIP modifications that we plan to apply to our SC451 program in enabling evasion of allogeneic and autoimmune rejection.

We believe that a stem cell-derived islet product candidate such as SC451 would likely maximize the benefit to patients, with potentially greater manufacturing scalability as compared to primary islet cells. Further, if the IST demonstrates persistence of allogeneic hypoimmune primary islet cells, it may accelerate our development of SC451.

Our work on the SC451 program is currently focused on manufacturing GMP-grade, genome-edited, PSC banks; scaling manufacturing; and characterizing the product.

GPC Program

Our GPC program, SC379, aims to deliver to patients healthy allogeneic GPCs, which are the precursors to both astroglia and myelin-producing oligodendrocytes. This program has the potential to treat myelin- and glial-based disorders, which represent a broad group of debilitating neurological disorders, such as MS and a number of neurodegenerative disorders, none of which have effective treatment alternatives. We intend to develop our stem cell-derived GPC therapy for secondary progressive MS, PMD other disorders of myelin, Huntington's disease, and other astrocytic diseases.

Background on Myelin- and Glial -Based Disorders

Glial cells are the support cells of the human CNS. The two major types of CNS-derived glial cells are oligodendrocytes, which are the cells that produce myelin, the insulating substance of the brain's white matter that enables neural conduction, and astrocytes, which are the support cells of neurons and their synapses. These two kinds of glial cells that arise from human GPCs (hGPCs) are responsible for remyelination in the injured and demyelinated adult brain and spinal cord.

Diseases of glial cells are among the most prevalent and disabling conditions in neurology. These disorders include the disorders of oligodendrocyte loss and myelin failure and the disorders of astrocytes, which include a number of neurodegenerative and psychiatric disorders. What all these disorders have in common is a significant glial contribution to their pathogenesis and a lack of disease-modifying treatment options.

Congenital Leukodystrophies. A number of hereditary disorders of oligodendrocyte loss or dysfunction are characterized by a failure in myelin synthesis or structural stability. Tens of thousands of children in the United States suffer from diseases of myelin loss. The most prototypic example of this class of diseases is PMD, an X-linked leukodystrophy most often manifesting in male infants and young boys caused by mutations in the oligodendrocytic PLP1 gene, which results in widespread hypomyelination. There is no treatment for PMD, which is typically fatal in childhood. We intend to evaluate the delivery of intracerebral transplants of stem cell-derived GPCs to the brains of PMD patients, with the goal of replacing PLP1 mutant oligodendrocytes with healthy cells capable of producing normally compact myelin. Prevalence of PMD in the general population is estimated to be approximately 1 in 100,000 in the United States. Although we are initially targeting PMD as our proof of concept, we believe our stem-cell derived GPCs may have broader applicability to other congenital leukodystrophies as well, which as a group affect a more significant population of about 1 in 7,600 births.

Multiple Sclerosis (MS). MS is a debilitating disease characterized by both inflammatory myelinolysis and degenerative axonal loss. There are two major forms: the initial relapsing remitting form, known as RRMS, and its later progressive neurodegenerative phase designated secondary progressive MS (SPMS). RRMS is characterized by clearly defined attacks with new or increasing neurologic symptoms. By contrast, SPMS is characterized by progressive neurodegeneration with a loss of neurons, including those that were previously demyelinated during the RRMS phase of the disease. The demyelination occurs in a diffuse fashion throughout the adult brain and appears to reflect a loss of axonal support by local oligodendrocytes. The delivery of GPCs into such a chronically demyelinated brain may offer tangible benefits through the oligodendrocytic engagement of axons as well as by myelin repair. MS is highly prevalent, with estimates of up to 1.0 million patients in the United States, 600,000 patients in Europe, and 2.8 million patients globally. Approximately 85% of MS patients receive an initial diagnosis of RRMS, while approximately 15% of patients receive an initial diagnosis of PPMS. Up to a third of RRMS patients transition to SPMS within a decade if untreated, and most RRMS patients will progress to SPMS within 20 to 25 years of their initial diagnosis. Success with a stem cell-derived GPC product in SPMS, and especially with a hypoimmune product, could enable further expansion into the RRMS patient population.

Huntington's Disease (HD). HD is a neurodegenerative disorder in which glial pathology appears to make a significant causal contribution. HD is an autosomal dominant disorder characterized by abnormally long CAG repeat expansions in the first exon of the huntingtin gene. The encoded polyglutamine expansions of mutant huntingtin protein disrupts its normal functions and protein-protein interactions, ultimately yielding widespread neuropathology, most rapidly evident in the neostriatum. We have found that glial pathology is a major contributor to the functional deficits of HD, and repairing the glial pathology has been shown to have significant and positive effects in animal models. In the United States, there are approximately 41,000 symptomatic HD patients and more than 200,000 at risk of inheriting HD. In Europe, there are approximately 50,000 patients with HD.

Current Treatment Landscape and Unmet Need

Congenital Leukodystrophies. There are no viable treatment options for these conditions. Patients' only options are supportive and palliative therapies for symptoms as they present.

MS. Current treatments for MS are largely limited to treatments for RRMS. There are few approved treatments for SPMS, and none are restorative, having, at best, marginal efficacy in delaying disease progression. Currently approved treatments for RRMS may be divided into three broad categories of disease -modifying therapies: (i) first-line injectables (such as beta-interferons and Copaxone®), (ii) newer oral agents (such as Tecfidera®, Gilenya®, Mayzent®, and Zeposia®), and (iii) high-efficacy agents (such as Tysabri®, Lemtrada®, and Ocrevus®). Despite many recently successful drug launches in the RRMS space, these drugs still only slow the progression of disease and aid in the recovery from attacks, and there remains no treatment that confers functional restoration or effective cure for RRMS.

HD. There are currently no treatments that stop or reverse HD. Treatment is limited to several medications that can help minimize symptoms, including tetrabenazine, antipsychotic drugs, antidepressants, and tranquilizers.

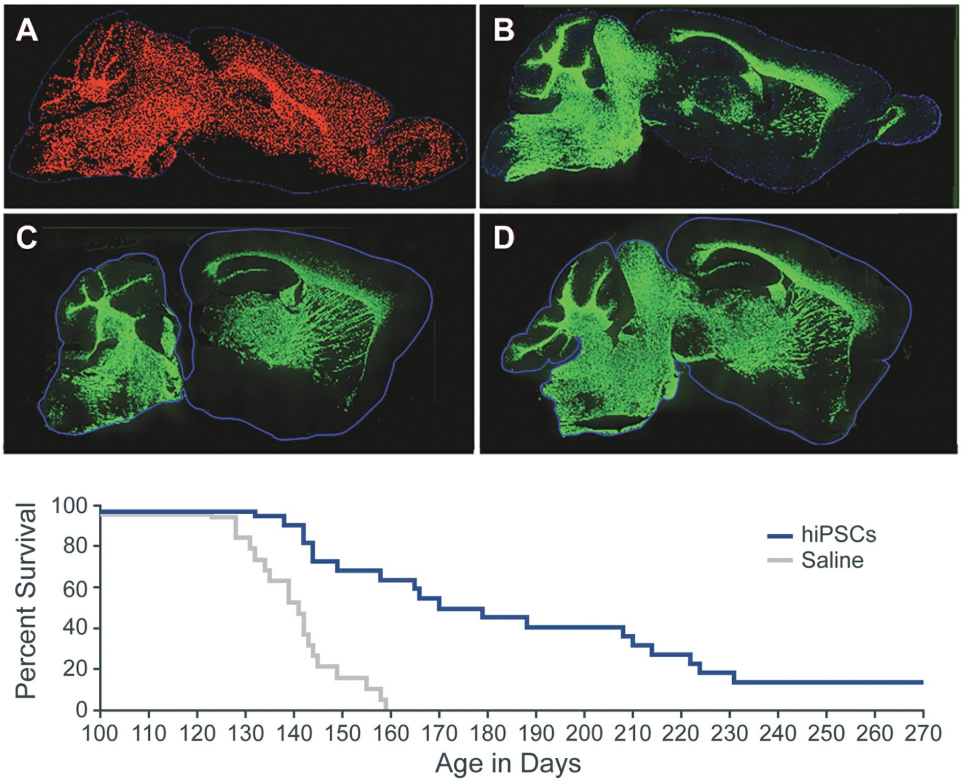
Our GPC Program Approach

Our approach to treat myelin and neurodegenerative disorders is via the delivery of healthy allogeneic stem cell-derived GPCs to the recipient. We have developed methods for producing and isolating GPCs from PSCs and delivering them in the purity and quantities necessary for their replacement of endogenous diseased cells. We believe that our *ex vivo* GPC therapy has compelling potential for use in both myelin disorders and glial-based neurodegenerative conditions.

Preclinical Data

Congenital Leukodystrophies. The capacity of stem cell-derived hGPCs for remyelination has been conducted in animal models of congenital hypomyelination. Our collaborators used newborn *shiverer* mice that have a genetic defect in myelin basic protein (MBP), resulting in their neurons being hypomyelinated and the mice having a shortened lifespan. When iPSC-derived hGPCs were transplanted into these mice, the hGPCs spread widely throughout the brain and developed as astrocytes and oligodendrocytes. These oligodendrocytes generated mature myelin that effectively restored neuronal conductance and prolonged survival in the transplanted mice. We believe that these data, as depicted in the figures below, suggest the feasibility of iPSC-derived hGPC implantation in treating childhood disorders of myelin formation and maintenance.

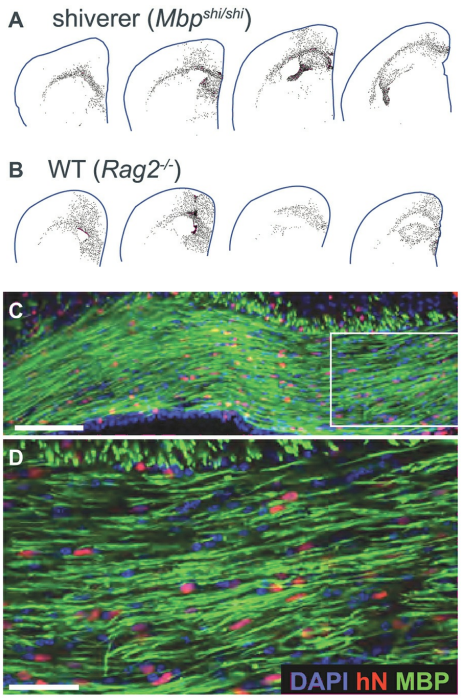
hGPCs Greatly Extend the Survival of Hypomyelinated Mice



A, Dot map indicating distribution of human iPSC-derived GPCs at 7 months of age, following neonatal engraftment in a shiverer mouse brain. Widespread colonization and chimerization of the host brains by iPSC-derived hGPCs is evident (human nuclear antigen, red). B, iPSC-derived hGPC-derived myelination in shiverer forebrain, at 7 months; section 1 mm lateral to A. Myelin basic protein (MBP)-immunoreactivity (green) is all human donor-derived. C, D, Myelination in sagittal sections taken at different mediolateral levels from 2 additional 7-month-old mice, each engrafted with iPSC-derived hGPCs at birth. E, Kaplan-Meier plot of survival of iPSC-Oligodendrocyte progenitor cells implanted (n=22) vs. saline-injected (n=19) control mice. Scale: A-B, 2 mm. Adapted from Wang, Cell SC 2013.

MS. Our prior studies established the ability of stem cell-derived hGPCs to myelinate the developing *shiverer* brain and rescue the afflicted mice. However, the experimental subjects were neonates, not adults. Until recently, it was unclear whether GPCs can migrate extensively in adult brain tissue, as would be required for the repair of diffusely demyelinated adult brains. To explore whether the introduction of stem cell-derived hGPCs delivered directly into the adult brain could remyelinate axons in such a setting as might be encountered clinically in MS, our collaborators studied three different biologic models. First, it was shown that stem cell-derived hGPCs can disperse within and myelinate the brains of adult *shiverer* mice (as depicted in the figure below). Second, it was shown that neonatally-engrafted hGPCs can generate new oligodendrocytes and remyelinate demyelinated axons after chemically-induced demyelination. This result demonstrated the ability of already-resident hGPCs to remyelinate previously myelinated axons after a new demyelinating insult experienced as an adult, as well as the ability of transplanted hGPCs to reside as a functional reservoir of new myelinogenic cells in the host brains. Third, it was shown that hGPCs transplanted into the adult brain after chemically induced demyelination can remyelinate denuded axons. These data suggest that transplanted hGPCs can disperse broadly and differentiate as myelinogenic cells in the adult brain, and that they are able to remyelinate demyelinated axons and white matter lesions of the brain after an insult experienced as an adult.

hGPCs Mediate Robust Myelination After Transplantation into the Adult *Shiverer* Brain



Human GPCs proved both highly migratory and robustly myelinogenic after delivery to the hypomyelinated adult shiverer x rag2-/- brain (mice were injected as post-weaning adults at 4-6 weeks). A, By 19-20 weeks of age, the injected cells had dispersed broadly throughout the forebrain white matter. B, hGPCs delivered to myelin wild type rag2-/- mice distributed throughout both gray and white matter. C, Oligodendrocyte differentiation and myelinogenesis by donor hGPCs was robust, with myelination of brain regions that would typically be demyelinated in shiverer mice. D, A higher power image of C shows the high proportion of donor cells in those brain regions. Note that DAPI marks all nuclei, hN marks the hGPCs, and MBP marks the remyelinated regions in C and D. From Windrem et al, Cell Reports 2020.

HD. Our collaborators explored the cellular basis for HD-related glial pathology and identified significant defects in potassium channel and glutamate uptake mechanisms in HD glia, which appeared to account for both the glial pathology and its deleterious effects on synaptic function. Together, these studies suggest a critical role for glial pathology in the progression of HD and suggest the potential for glial cell replacement as a therapeutic strategy in HD, and more broadly, to other neurodegenerative diseases in which glial pathology might be causally contributory. It was confirmed in preclinical mouse studies that stem cell-derived hGPC transplant ameliorated both the neuronal and glial pathology of HD by restoring synaptic homeostasis and normal synaptic function to the most affected regions of the host brain.

The majority of the studies with human GPCs thus far have been xenogeneic grafts of human GPCs to neonatal or adult mice or rats (and, in a small sample proof-of-concept study limited to adult tissue-derived hGPCs, NHPs). Our collaborators have also performed studies with murine GPCs transplanted into both developing and adult mice, which have confirmed allogeneic GPC migration and integration. However, we have no assurance that human GPC engraftment of human brain will result in the widespread migration and colonization of host brain that is seen with xenogeneic grafts. To better model the human-to-human graft paradigm, our collaborators have established a new model to evaluate if GPC engraftment will result in migration and colonization in a host brain. This model allows observation of the competitive interactions of the two separately tagged human GPC populations. The human-to-human grafts expanded and integrated well in their humanized host, with competitive interactions. As might be anticipated in the clinical setting of healthy cells being transplanted for the purpose of replacing lost or diseased hGPCs, the healthy donor cells outcompete both diseased and older cells to ultimately colonize the hosts. These data have provided preclinical assurance of the fundamental premise of our approach, that healthy human donor cells can replace lost or diseased human cells *in vivo*. That said, this determination remains to be made in patients.

GMP Grade Stem Cell-Derived hGPCs for Clinical Studies

We have established a protocol to direct differentiation of human ESCs, as well as iPSCs, to hGPCs. These hGPCs cells remain bipotential for astrocytes and oligodendrocytes, and they differentiate to either fate depending on local signaling. A GMP-compliant protocol has been established, which will be used to produce cells for our IND-enabling safety and toxicity studies. We have transferred this protocol to a GMP facility to produce clinical-grade cells and plan to use these cells for initial clinical trial supply.

Development Plan and Key Next Steps

We plan to submit an IND for SC379 following completion of safety and toxicology studies. We also plan to conduct definitive preclinical efficacy studies using the anticipated clinical product, which we believe will replicate studies that we have published. Since GPCs are not a terminally differentiated cell type and divide and differentiate *in vivo* post-transplantation, we plan to continue to assess potential safety risks, including the risk of tumorigenicity. We anticipate beginning human testing for SC379 in at least one indication as early as 2025.

Manufacturing Strategy and Approach. Although the field of cell and gene therapy has had a number of successes with innovative therapies, the challenges of manufacturing at industrial scale have limited access for patients in need. As was the case during the initial development of recombinant biologics, an improvement to our ability to characterize these products will be essential to increasing patient access. It is especially critical to have an in-depth understanding of the impact of manufacturing processes on the product quality attributes and resulting clinical performance of the product.

From inception, we have recognized the key role manufacturing plays in enabling the access of these innovative engineered cells as medicines. Two areas of particular focus are product analytical and biological characterization, leading to a better definition of critical product attributes, as well as process understanding, leading to better control the impact of process parameters on these critical product attributes.

We have developed a manufacturing strategy with early investments in people, technology, and infrastructure, which requires:

- establishing a team with diverse, experienced talents with extensive knowledge of both the process and analytical sciences in the field of cell and gene therapy, as well as CMC product development expertise from preclinical to global commercialization;
- establishing multiple manufacturing platforms for our diverse portfolio; and
- establishing infrastructure from lab bench to a GMP manufacturing and supply chain network.

To support our development pipeline, we are initially establishing manufacturing platforms in allogeneic T cells and PSC-derived therapies.

Although our manufacturing platforms are very different in terms of the manufacturing process and supply chain, they also share some common challenges and opportunities. For example, product characterization and analytical development are critical, and these capabilities are fungible across platforms. In addition, we are focusing on some of the key areas in each of our platforms to enable scaled manufacturing. For the allogeneic T cell platform, we are focusing on scaling the multiplex gene editing process and understanding of the impact of the variability of the starting material from healthy donors to on product quality. For stem-cell derived therapies, such as islet cells and GPCs, we are focusing on developing a scalable process and analytical technologies to characterize stability of the starting cells, end cell products, and critical product quality attributes.

To establish our manufacturing capability, we started with a non-GMP pilot plant for engineered cell platform processes with up to 200L bioreactor scale. This provides the infrastructure for process and technology development, technology transfer support, and production for non-GMP material such for GLP toxicology studies. In addition, we are taking a hybrid approach to establish our end-to-end supply chains for our manufacturing platforms, leveraging a combination of internal manufacturing capability and external CDMOs for clinical supplies, in a staged manner:

- we will use CDMOs for initial GMP supply to support our upcoming INDs and early-stage clinical trials; and
- we intend to build the internal manufacturing facilities needed to support clinical trials and commercialization of our therapies. In addition, we anticipate we will use CDMOs for at least some portions of our supply chain for the foreseeable future.

Operating our own internal manufacturing facilities to complement our CDMO networks is a key to our strategy. Accordingly, in June 2022, we entered into a long-term lease to establish and operate our own GMP manufacturing facility to support our late-stage clinical development and early commercial product candidates across our product portfolio, such as the production of allogeneic T cells. We believe that investing in an internal manufacturing facility will offer us a competitive advantage that will better position us to execute on our goal of ensuring broad and uninterrupted patient access to our therapies, including by allowing us to mitigate delays related to third-parties, including related to capacity-, personnel-, or production-related issues at our CDMOs; develop proprietary knowledge and product and process expertise we can use across our programs to create long-term value; and design a facility that can be optimized for and adaptable to our existing and future needs.

Competition

Other companies have stated that they are developing cell and gene therapies that may address oncology, diabetes, and CNS disorders. Some of these companies may have substantially greater financial and other resources than we have, such as larger research and development staff and well-established marketing and salesforces or may operate in jurisdictions where lower standards of evidence are required to bring products to market. For example, we are aware that some of our competitors, including Novartis AG, Gilead Sciences, Inc., Bristol-Myers Squibb Company, Novo Nordisk A/S, Johnson & Johnson, Legend Biotech Corporation, Allogene Therapeutics, Inc., Cargo Therapeutics, Inc., CRISPR Therapeutics AG, Caribou Biosciences, Inc., Cabaletta Bio, Inc., Kyverna Therapeutics, Inc., Fate Therapeutics, Inc., Century Therapeutics, Inc., 2seventy bio, Inc., Vertex Pharmaceuticals Incorporated, and Eli Lilly and Company might be conducting large-scale clinical trials for therapies that could be competitive with our *ex vivo* and *in vivo* programs. Among companies pursuing *ex vivo* and *in vivo* cell engineering, we believe we are substantially differentiated by our robust intellectual property portfolio, extensive research, rigorous and objective approach, and multidisciplinary capabilities.

Intellectual Property

We strive to protect and enhance the proprietary technology, inventions, and improvements that are commercially important to our business, including seeking, maintaining, and defending patent rights, whether developed internally or licensed from our collaborators or other third parties. Our policy is to seek to protect our proprietary position by, among other methods, filing patent applications in the United States and in jurisdictions outside of the United States related to our proprietary technology, inventions, improvements, and product candidates that are important to the development and implementation of our business. We also rely on trade secrets and know-how relating to our proprietary technology and product candidates, continuing innovation, and in-licensing opportunities to develop, strengthen, and maintain our proprietary position in the field of cell and gene therapy. We additionally plan to rely on data exclusivity, market exclusivity, and patent term extensions when available and, where applicable, plan to seek and rely on regulatory protection afforded through orphan drug designations. Our commercial success will depend in part on our ability to obtain and maintain patent and other proprietary protection for our technology, inventions, and improvements, preserve the confidentiality of our trade secrets, maintain our licenses to use intellectual property owned by third parties, defend and enforce our proprietary rights, including our patents, and operate without infringing on the valid and enforceable patents and other proprietary rights of third parties.

We have in-licensed and developed numerous patents and patent applications, which include claims directed to compositions, methods of use, processes, dosing, and formulations, and possess substantial know-how and trade secrets relating to the development and commercialization of our *ex vivo* and *in vivo* cell engineering platforms and related product candidates, including related manufacturing processes. As of January 2024, our in-licensed and owned patent portfolio consisted of approximately 36 licensed or owned U.S. issued patents, approximately 76 licensed United States pending patent applications, and approximately 55 owned U.S. pending patent applications, as well as approximately 58 licensed patents issued in jurisdictions outside of the United States, approximately 281 licensed patent applications pending in jurisdictions outside of the United States, and approximately 259 owned patent applications pending in jurisdictions outside of the United States (including approximately 38 owned pending Patent Cooperation Treaty (PCT) applications) that, in many cases, are counterparts to the foregoing United States patents and patent applications. The patents and patent applications outside of the United States in our portfolio are held primarily in Europe, Canada, China, Japan, and Australia. For information related to our in-licensed intellectual property, see the subsection below titled “—Key Intellectual Property Agreements.”

For the product candidates and related manufacturing processes we develop and may commercialize in the normal course of business, we intend to pursue, when possible, composition, method of use, process, dosing, and formulation patent protection. We may also pursue patent protection with respect to manufacturing, drug development processes and technology, and our technology platforms. When available to expand our exclusivity, our strategy is to obtain or license additional intellectual property related to current or contemplated development platforms, core elements of technology, and/or product candidates.

Individual patents extend for varying periods of time, depending upon the date of filing of the patent application, the date of patent issuance, and the legal term of patents in the countries in which they are obtained. Generally, patents issued for applications filed in the United States and in many jurisdictions worldwide have a term that extends to 20 years from the earliest non-provisional filing date. In the United States, a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the Unites States Patent and Trademark Office (USPTO) in examining and granting a patent counterbalanced by delays on the part of a patentee, or may be shortened if a patent is terminally disclaimed over another patent. In addition, in certain instances, the term of a United States patent that covers an FDA-approved drug may also be eligible for patent term extension, which recaptures a portion of the term effectively lost as a result of the testing and regulatory review periods required by the FDA. The patent term extension period cannot be longer than five years, and the total patent term, including the extension, cannot exceed 14 years following FDA approval. There is no guarantee that the applicable authorities will agree with our assessment of whether such extensions should be granted, and, if granted, the length of such extensions. Similar provisions are available in Europe and other foreign jurisdictions to extend the term of a patent that covers an approved drug. Our patents issued as of January 2024 have terms expected to expire on dates ranging from 2028 to 2042. If patents are issued on our patent applications pending as of January 2024, the resulting patents are projected to expire on dates ranging from 2028 to 2044. However, the actual protection afforded by a patent varies on a product-by-product and country-to-country basis and depends upon many factors, including the type of patent, the scope of its coverage, the availability of regulatory-related extensions, the validity and enforceability of the patent, and the availability of legal remedies in a particular country.

In some instances, we submit patent applications directly to the USPTO as provisional patent applications. Provisional patent applications were designed to provide a lower-cost first patent filing in the United States. Corresponding non-provisional patent applications must be filed not later than 12 months after the provisional application filing date. The corresponding non-provisional application benefits in that the priority date(s) of this patent application is/are the earlier provisional application filing date(s), and the patent term of the finally issued patent is calculated from the later non-provisional application filing date. This system allows us to obtain an early priority date, add material to the patent application(s) during the priority year, obtain a later start to the patent term, and to delay prosecution costs, which may be useful in the event that we decide not to pursue examination in an application. 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.

We file United States non-provisional applications and PCT applications that claim the benefit of the priority date of earlier filed provisional applications, when applicable. The PCT system allows an applicant to file a single application within 12 months of the original priority date of the patent application and to designate all of the 153 PCT member states in which national patent applications can later be pursued based on the international patent application filed under the PCT. The PCT searching authority performs a patentability search and issues a non-binding patentability opinion which can be used to evaluate the chances of success for the national applications in foreign countries prior to having to incur the filing fees. Although a PCT application does not issue as a patent, it allows the applicant to seek protection in any of the member states through national-phase applications. At the end of the period of two and a half years from the first priority date of the patent application, separate patent applications can be pursued in any of the PCT member states either by direct national filing or in some cases by filing through a regional patent organization, such as the European Patent Organization. The PCT system delays expenses, allows a limited evaluation of the chances of success for national/regional patent applications, and enables substantial savings where applications are abandoned within the first two and a half years of filing.

We determine claiming strategy for each patent application on a case-by-case basis. We always consider the advice of counsel and our business model and needs. We file patent applications containing claims for protection of all useful applications of our proprietary technologies and any product candidates, as well as all new applications or uses we discover for existing technologies and product candidates, assuming these are strategically valuable. We continuously reassess the number and type of patent applications, as well as the pending and issued patent claims, to help ensure that maximum coverage and value are obtained for our inventions given existing patent office rules and regulations. Further, claims may be and typically are modified during patent prosecution to meet our intellectual property and business needs.

We recognize that the ability to obtain patent protection and the degree of such protection depends on a number of factors, including the extent of the prior art, the novelty and non-obviousness of the invention, and the ability to satisfy the enablement requirement of patent laws. In addition, the coverage claimed in a patent application can be significantly reduced before the patent is issued, and its scope can be reinterpreted or further altered even after patent issuance. Consequently, we may not obtain or maintain adequate patent protection for any of our future product candidates or for our technology platforms. 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.

The area of patent and other intellectual property rights in biotechnology is an evolving one with many risks and uncertainties. The patent positions of companies like ours are generally uncertain and involve complex legal and factual questions. No consistent policy regarding the scope of claims allowable in patents in the fields of cell and gene therapy has emerged in the United States. The patent positions of companies outside of the United States can be even more uncertain. Changes in either the patent laws or their interpretation in the United States and worldwide may diminish our ability to protect our inventions and enforce our intellectual property rights, and more generally could affect the value of our intellectual property. In particular, our ability to stop third parties from making, using, selling, offering to sell, or importing products that infringe our intellectual property will depend in part on our success in obtaining and enforcing patent claims that cover our technology, inventions, and improvements. With respect to both licensed and company-owned intellectual property, we cannot be sure that patents will be granted with respect to any of our pending patent applications or with respect to any patent applications filed by us in the future, nor can we be sure that any of our existing patents or any patents that may be granted to us in the future will be commercially useful in protecting our products and the methods used to manufacture those products. Moreover, our issued patents do not guarantee us the right to practice our technology in relation to the commercialization of our products, as third parties may have blocking patents that could be used to prevent us from commercializing our patented product candidates and practicing our proprietary technology. It is uncertain whether the issuance of any third-party patent would require us to alter our development or commercial strategies, products, or processes, obtain licenses, or cease certain activities. Our breach of any license agreements or our failure to obtain a license to proprietary rights required to develop or commercialize our future products may have a material adverse impact on us. If third parties prepare and file patent applications in the United States that also claim technology to which we have rights, we may have to participate in interference or derivation proceedings in the USPTO to determine priority of invention. Our issued patents and those that may issue in the future may be challenged, invalidated, or circumvented, which could limit our ability to stop competitors from marketing related products or limit the length of the term of patent protection that we may have for our product candidates. In addition, the rights granted under any issued patents may not provide us with protection or competitive advantages against competitors with similar technology. Furthermore, our competitors may independently develop similar technologies. For these reasons, we may have competition for our product candidates. Moreover, because of the extensive time required for development, testing, and regulatory review of a potential product candidate, it is possible that, before any particular product candidate can be commercialized, any related patent may expire or remain in force for only a short period following commercialization, thereby reducing any advantage of the patent. Our commercial success will also depend in part on not infringing upon the proprietary rights of third parties. Patent disputes are sometimes interwoven into other business disputes.

As of January 2024, our registered trademark portfolio contained approximately 24 registered trademarks and pending trademark applications, consisting of approximately two pending trademark applications and two registered trademarks in the United States, and approximately 16 registered trademarks and approximately four pending trademark applications in the following countries through both national filings and under the Madrid Protocol: Australia, Canada, China, European Union, India, Japan, Republic of Korea, the United Kingdom, Singapore, and Switzerland.

We may also rely, in some circumstances, on confidential information, including trade secrets, to protect our technology. However, trade secrets are difficult to protect. We seek to protect our technology and product candidates, in part, by entering into confidentiality agreements with those who have access to our confidential information, including our employees, contractors, consultants, collaborators, and advisors. We also seek to preserve the integrity and confidentiality of our proprietary technology and processes by maintaining physical security of our premises and physical and electronic security of our information technology systems. Although we have confidence in these individuals, organizations, and systems, agreements or security measures may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or may be independently discovered by competitors. To the extent that our employees, contractors, consultants, collaborators, and advisors 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 this and more comprehensive risks related to our proprietary technology, inventions, improvements, and products, see the subsection titled “Risk Factors —Risks Related to Intellectual Property and Information Technology.”

Key Intellectual Property Agreements

The following describes the key agreements by which we have acquired and maintained certain technology related to our *ex vivo* and *in vivo* cell engineering platforms and therapeutic programs.

***Ex vivo* Cell Engineering Platform**

License Agreement with Harvard

In March 2019, we entered into a license agreement (as amended, the Harvard Agreement) with the President and Fellows of Harvard College (Harvard), pursuant to which we obtained an exclusive, worldwide, sub-licensable license under certain patent rights controlled by Harvard to make, have made, use, offer for sale, sell, have sold and import (i) products and services covered by the patent rights and (ii) products containing stem cells, pluripotent cells or cells derived from stem cells, or pluripotent cells with certain specified genetic modifications ((i) and (ii) together, Harvard Products) or otherwise practice under and exploit the licensed patent rights, for the treatment of disease in humans or, in the case of certain other patent rights, for applications that involve the use of cells derived *ex vivo* from stem cells in the treatment of disease in humans. We also obtained a non-exclusive, sub-licensable license under certain other patent rights in the United States, and a non-exclusive, sub-licensable, worldwide license under know-how pertaining to the licensed patent rights, to make, have made, use, offer for sale, sell, have sold and import the Harvard Products, or otherwise practice under and exploit the licensed patent rights and know-how, for the treatment of disease in humans. We have the option to obtain such non-exclusive rights in additional jurisdictions if Harvard is successful in obtaining the right to grant such rights from the third-party co-owner of such patent rights. In October 2021, we entered into an amendment to the Harvard Agreement to include products containing primary cells with certain specified genetic modifications as Harvard Products. We utilize these license rights in our *ex vivo* cell engineering platform relying on our hypoimmune technology.

We are obligated to use commercially reasonable efforts to develop Harvard Products in accordance with a written development plan, to market the Harvard Products following receipt of regulatory approval, and to achieve certain specified development and regulatory milestones within specified time periods, as such period may be extended, for at least two Harvard Products.

The licenses granted pursuant to the Harvard Agreement are subject to certain rights retained by Harvard and the rights of the United States government. The retained rights of Harvard pertain only to the ability of Harvard and other not-for-profit research organizations to conduct academic research and educational and scholarly activities and do not limit our ability to pursue our programs and product candidates. We agreed that we will not use any of the licensed patent rights for human germline modification, including intentionally modifying the DNA of human embryos or human reproductive cells.

Pursuant to the Harvard Agreement, we paid Harvard an upfront fee of $3.0 million, and we issued 2.2 million shares of our Series A-2 convertible preferred stock (which converted to shares of our common stock in connection with our initial public offering) to Harvard as partial consideration for the licenses granted under the Harvard Agreement. Additionally, we paid $6.0 million to Harvard in connection with the issuance of shares of our Series B convertible preferred stock. We paid Harvard annual license maintenance fees of $20,000 for 2019, $50,000 for 2020, and $100,000 for each of 2021, 2022, 2023, and 2024, and we are required to pay annual license maintenance fees of $100,000 for each calendar year thereafter for the remainder of the term. We are required to pay Harvard up to an aggregate of $15.2 million per Harvard Product upon the achievement of certain specified development and regulatory milestones for up to a total of five Harvard Products, or an aggregate total of $76.0 million for all five Harvard Products. These milestone payments would double if we undergo a change of control. We are also obligated to pay, on a product-by-product and country-by-country basis, royalties in the low single-digit percentage range on quarterly net sales of Harvard Products covered by licensed patent rights, and a lower single-digit percentage royalty on quarterly net sales of Harvard Products not covered by licensed patent rights. The royalty rates with respect to Harvard Products covered by licensed patent rights are also subject to specified and capped reductions for loss of market exclusivity and for payments owed to third parties with respect to patent rights which cover Harvard Products in the territory. We are also obligated to pay Harvard a percentage of certain sublicense income ranging from the high single-digit to low double-digit percentage range. Pursuant to the terms of the Harvard agreement, we may be required to make up to an aggregate of $175.0 million in success payments to Harvard (Harvard Success Payments), payable in cash, based on increases in the per share fair market value of our common stock. The potential Harvard Success Payments are based on multiples of increasing value ranging from 5x to 40x based on a comparison of the per share fair market value of our common stock relative to the original issuance price of $4.00 per share at ongoing pre-determined valuation measurement dates. The Harvard Success Payments can be achieved over a maximum of 12 years from the effective date of the agreement. If a higher success payment tier is met at the same time a lower tier is met, both tiers will be owed. Any previous Harvard Success Payments made are credited against the Harvard Success Payment owed as of any valuation measurement date so that Harvard does not receive multiple success payments in connection with the same threshold. As of December 31, 2023, a Harvard Success Payment had not been triggered.

The Harvard Agreement will expire upon the expiration of the last-to-expire valid claim within the licensed patent rights or, if later, at the end of the final royalty term, which is determined on a Harvard Product-by-Harvard Product and country-by-country basis, and is the later of (i) the date on which the last valid claim within the licensed patent rights covering such Harvard Product in such country expires, (ii) expiry of regulatory exclusivity for such Harvard Product in such country, or (iii) ten years from the first commercial sale of such Harvard Product in such country, which we expect to occur in 2039. We also have the right to terminate the Harvard Agreement in its entirety for any reason upon 45 days' prior written notice to Harvard. Either party may terminate the Harvard Agreement upon a material breach by the other party that is not cured within 60 days after receiving written notice thereof. Harvard may terminate the Harvard Agreement upon written notice in the event of our bankruptcy, insolvency, or similar proceedings. If we terminate the Harvard Agreement for convenience, our obligations to pay milestones and royalties with respect to Harvard Products that are not then covered by licensed patent rights will survive for the remainder for the applicable royalty term. If the Harvard Agreement is terminated for any reason, then sublicensees, other than our affiliates or sublicensees in material default or at fault for the termination, have the right to enter into a direct license with Harvard on substantially the same non-economic terms and on economic terms providing for the payment to Harvard of the consideration that would otherwise have been payable if the Harvard Agreement and the sublicense were not terminated.

License Agreement with UCSF

In January 2019, we entered into a license agreement (as amended, the UCSF Agreement) with The Regents of the University of California (The Regents) acting through its Office of Technology Management, University of California San Francisco (UCSF), pursuant to which we obtained an exclusive license to inventions related to immunoengineered pluripotent cells and derivatives claimed in United States and international patents and patent applications (UCSF Patent Rights) by The Regents. The license grants us rights to make, have made, use, sell, offer for sale and import licensed products that are covered by such UCSF Patent Rights, provide licensed services, practice licensed methods, and otherwise practice under the UCSF Patent Rights, for use in humans only, in the United States and other countries where The Regents is not prohibited by applicable law from granting such UCSF Patent Rights. We have the right to sublicense our rights granted under the UCSF Agreement to third parties subject to certain terms and conditions. We utilize these license rights in our *ex vivo* cell engineering platform that relies on our hypoimmune technology.

We are obligated, directly or through affiliates or sublicensees, to use commercially reasonable efforts to develop, manufacture, and sell one or more licensed products and licensed services and to bring one or more licensed products or licensed services to market. We are required to use commercially reasonable efforts to obtain all necessary governmental approvals in each country where licensed products or licensed services are manufactured, used, sold, offered for sale, or imported. We are required to spend at least $30.0 million towards research, development, and commercialization of licensed products within five years after the closing of our Series A-2 convertible preferred stock financing. In addition, we are required to achieve certain specified development and regulatory milestones within specified time periods. We have the ability to extend the time periods for achievement of development and regulatory milestones under certain terms set forth in the UCSF Agreement, including payment of extension fees. If we are unable to complete any of the specified milestones by the completion date, or extended completion date, for such milestone, then The Regents has the right and option to either terminate the Agreement, subject to our ability to cure the applicable breach, or convert our exclusive license to a non-exclusive license.

The Regents reserves and retains the right to make, use and practice the inventions, and any related technology, and to make and use any products and to practice any process that is the subject of the UCSF Patent Rights (and to grant any of the foregoing rights to other educational and non-profit institutions) for educational and non-commercial research purposes, including publications and other communication of research results. This reservation of rights does not limit our ability to pursue our programs and product candidates.

Pursuant to the UCSF Agreement, we paid an upfront license fee of $100,000 to The Regents, and we issued The Regents 0.7 million shares of our Series A-2 convertible preferred stock (which converted to shares of our common stock in connection with our initial public offering). In addition, we entered into an amendment to the UCSF Agreement in December 2020, pursuant to which we issued 37,500 shares of our common stock to The Regents. We are required to pay license maintenance fees ranging from $10,000 on the first anniversary of the effective date of the UCSF Agreement to $40,000 on the sixth anniversary and continuing annually thereafter. This fee will not be due if we are selling or exploiting licensed products or licensed services and paying an earned royalty to The Regents on net sales of such licensed products or licensed services. We are also required to pay The Regents up to an aggregate of $2.45 million per licensed product upon the achievement of certain specified development and regulatory milestones for the first five licensed products and half such amount for the second five licensed products, for an aggregate total of $18.4 million in development and regulatory milestone payments. Additionally, we are required to pay The Regents up to an aggregate of $0.5 million per licensed product upon the achievement of certain commercial milestones for the first five licensed products and half such amount for the second five licensed products, for an aggregate total of $3.75 million in commercial milestone payments. With respect to each licensed product, licensed service, or licensed method, we are obligated to pay, on a country-by-country basis, tiered royalties on net sales with percentages in the low single-digits. The royalty rates are subject to specified capped reductions for payments owed to unaffiliated third parties in consideration for patent rights, or patent rights together with know-how, in order to practice licensed methods or to make, have made, use sell, offer to sell, or import licensed products or licensed services. We are required to pay to The Regents a minimum annual royalty of $100,000 beginning with the year of the first sale of a licensed product or licensed service and ending upon the expiration of the last-to-expire UCSF Patent Right. This will be credited against any earned royalty due for the twelve-month period following for which the minimum payment was made and pro-rated. We are also obligated to pay The Regents a percentage of certain non-royalty sublicense income ranging from the low double-digits to mid-twenties.

The UCSF Agreement will expire on expiration or abandonment of the last valid claims within the UCSF Patent Rights licensed thereunder, which we expect to occur in 2040. The Regents has the right to terminate the Agreement if we fail to cure or discontinue a material breach within 60 days of receiving a notice of default. We have the right to terminate the UCSF Agreement in its entirety or under certain UCSF Patent Rights on a country-by-country basis at any time by providing 60 days' notice of termination to The Regents. The UCSF Agreement will automatically terminate in the event of our bankruptcy that is not dismissed within a specified time period. The Regents may immediately terminate the Agreement upon written notice if we file a non-defensive patent challenge. The termination of the UCSF Agreement will not relieve us of obligations to pay any fees, royalties, or other payments owed to The Regents at the time of such termination or expiration, including the right to receive earned royalties. If the UCSF Agreement is terminated for any reason, then, upon the request of any sublicensee, The Regents will enter into a direct license with such sublicensee on the same terms as the UCSF Agreement, taking into account any difference in license scope, territory, and duration of sublicense grant, provided that such sublicensee is not at the time of such termination in breach of its sublicensing agreement and is not at the time of such termination an opposing party in any legal proceeding against The Regents.

2019 Exclusive License Agreement with Washington University

In November 2019, we entered into a license agreement (the 2019 WU Agreement) with Washington University, pursuant to which we obtained an exclusive sublicensable, non-transferable, worldwide license under certain Washington University patent rights related to genetically engineered hypoimmunogenic stem cells to research, develop, make, have made, and sell products, the manufacture, use, sale or import of which by us or our sublicensees would, in the absence of the 2019 WU Agreement, infringe at least one valid claim of the licensed patent rights (WU Hypoimmune Products).

We are obligated to use commercially reasonable efforts to (i) develop, manufacture, promote and sell WU Hypoimmune Products and (ii) achieve certain development, regulatory, and commercial diligence milestones within specified time periods. We have the ability to extend the time periods for achievement of such milestones under certain terms set forth in the 2019 WU Agreement, including payment of extension fees.

Washington University retains the right to make, have made, use, and import WU Hypoimmune Products in fields relating to diagnosis, prevention, and treatment of human diseases or disorders for research and educational purposes, including collaboration with other nonprofit entities, but excluding any commercial purposes, and such retained rights do not limit our ability to pursue our programs and product candidates. Washington University retains all rights not granted to us under the patents. In addition, the 2019 WU Agreement is subject to certain rights retained by the United States government, including the requirement that licensed products sold in the United States be substantially manufactured in the United States.

Pursuant to the 2019 WU Agreement, we paid Washington University an upfront license issue fee of $75,000. We are required to pay Washington University up to $100,000 per year in license maintenance fees on each anniversary of the 2019 WU Agreement's effective date until the first commercial sale of a WU Hypoimmune Product. Upon the achievement of certain development and regulatory milestones, we are required to pay Washington University up to an aggregate of $2.0 million in milestone payments per WU Hypoimmune Product for the first three WU Hypoimmune Products, for an aggregate of $6.0 million in development and regulatory milestones. Additionally, upon the achievement of certain commercial milestones, we are required to pay Washington University up to an aggregate of $2.5 million in milestone payments per WU Hypoimmune Product for the first three WU Hypoimmune Products, for an aggregate of $7.5 million in commercial milestones. We are also obligated to pay royalties as a percentage of annual net sales of WU Hypoimmune Products in the low single-digits, subject to a minimum amount of royalties payable in advance. The minimum annual royalty for the first anniversary of the effective date following the first commercial sale will be $100,000 and subsequently will increase up to a maximum minimum annual royalty of $750,000 on the fourth anniversary of the effective date following the first commercial sale. The royalties are payable provided there is at least one valid claim of licensed patent rights present in the country of manufacture or sale. The royalty rates are also subject to specified and capped reduction upon certain other events. Furthermore, we are obligated to pay Washington University a percentage of certain non-royalty sublicense income in the low double-digits.

The 2019 WU Agreement will expire upon the last-to-expire valid claim under the licensed patent rights, which we expect to occur in 2038. We have the right to terminate the 2019 WU Agreement for any reason upon 90 days' prior written notice to Washington University. Washington University may terminate the 2019 WU Agreement upon our material breach that is not cured within 30 days after receiving written notice thereof. In addition, Washington University may terminate the 2019 WU Agreement (i) upon 30 days' written notice if we fail to achieve certain development, regulatory, or commercial diligence milestones and are unable to resolve Washington University's concerns through good faith negotiations in accordance with the 2019 WU Agreement, (ii) upon our bankruptcy or insolvency, or (iii) if an order is made or a notice is issued convening a meeting of our stockholders to consider the passing of a resolution of our winding up or a resolution is passed for our winding up (in each case, other than for the purpose of amalgamation or reconstruction). If the 2019 WU Agreement terminates prior to the expiration of the last-to-expire licensed patent rights, we agree (i) to promptly discontinue the exportation of licensed products, (ii) to promptly discontinue the manufacture, sale, and distribution of the licensed products, (iii) to promptly destroy all licensed products in inventory, and (iv) not to manufacture, sell, or distribute licensed products until the expiration of the applicable last-to-expire licensed patent rights.

2020 License Agreement with Washington University

In September 2020, we entered into an exclusive license agreement (the 2020 WU Agreement) with Washington University for certain patent rights relating to the methods and compositions of generating cells of endodermal lineage and beta cells and uses thereof. Under the 2020 WU Agreement, we obtained an exclusive, worldwide, non-transferable, and royalty-bearing license under the patent rights to research, develop, make, have made, sell, offer for sale, have sold, use, have used, export, and import licensed products, the manufacture, use, sale or import of which by us or our sublicensees would, in the absence of the 2020 WU Agreement, infringe at least one valid claim of the licensed patent rights, solely in fields relating to diagnosis, prevention, and treatment of human diseases or disorders. We utilize these license rights in our *ex vivo* cell engineering platform that relies on our hypoimmune technology, including our beta cell program.

Under the 2020 WU Agreement, we are obligated to use commercially reasonable efforts to (i) develop, manufacture, promote, and sell licensed products, and (ii) achieve certain development, regulatory, and commercial diligence milestones within specified time periods. We have the ability to extend the time periods for achievement of such milestones under certain terms set forth in the 2020 WU Agreement, including payment of extension fees.

Washington University retains the right to use the licensed patent rights to make, have made, use, and import licensed products worldwide in fields relating to diagnosis, prevention, and treatment of human disease or disorders for research and educational purposes, including collaboration with other nonprofit entities, but expressly excluding any commercial purposes, and such retained rights do not limit our ability to pursue our programs and product candidates. In addition, the 2020 WU Agreement is subject to certain rights retained by the United States government, including the requirement that licensed products sold in the United States be substantially manufactured in the United States.

Pursuant to the 2020 WU Agreement, we paid Washington University an upfront license issue fee of $150,000. We are required to pay Washington University up to $100,000 per year in license maintenance fees on each anniversary of the 2020 WU Agreement's effective date until the first commercial sale of a licensed product. Upon the achievement of certain development and regulatory milestones, we are required to pay Washington University up to an aggregate of $2.0 million per licensed product for the first three licensed products under the 2020 WU Agreement, for an aggregate of $6.0 million in development and regulatory milestones. Additionally, of certain commercial milestones, we are required to pay Washington University up to an aggregate of $4.5 million per licensed product for the first three licensed products under the 2020 WU Agreement, for an aggregate of $13.5 million in commercial milestones. We are also obligated to pay royalties as a percentage of annual net sales of licensed products in the low single-digits, subject to a minimum amount of royalties payable in advance. The minimum annual royalty for the first anniversary of the effective date following the first commercial sale will be $100,000 and subsequently will increase up to a maximum minimum annual royalty of $750,000 on the fourth anniversary of the effective date following the first commercial sale. The royalties are payable provided there is at least one valid claim of licensed patent rights present in the country of manufacture or sale. The royalty rates are also subject to specified and capped reduction upon certain other events. Furthermore, we are obligated to pay Washington University a percentage of certain non-royalty sublicense income in the low double-digits.

The 2020 WU Agreement will expire upon the last-to-expire valid claim under the licensed patent rights, which we expect to occur in 2038. We have the right to terminate the 2020 WU Agreement for any reason upon 90 days' prior written notice to Washington University. Washington University may terminate the 2020 WU Agreement upon our material breach that is not cured within 30 days after receiving written notice thereof. In addition, Washington University may terminate the 2020 WU Agreement (i) upon 30 days' written notice if we fail to achieve certain development, regulatory, or commercial diligence milestones and are unable to resolve Washington University's concerns through good faith negotiations in accordance with the 2020 WU Agreement, (ii) upon our bankruptcy or insolvency, or (iii) if an order is made or a notice is issued convening a meeting of our stockholders to consider the passing of a resolution of our winding up or a resolution is passed for our winding up (in each case, other than for the purpose of amalgamation or reconstruction). If the 2020 WU Agreement terminates prior to the expiration of the last-to-expire licensed patent rights, we agree (i) to promptly discontinue the exportation of licensed products, (ii) to promptly discontinue the manufacture, sale and distribution of the licensed products, (iii) to promptly destroy all licensed products in inventory, and (iv) not to manufacture, sell, or distribute licensed products until the expiration of the applicable last-to-expire licensed patent rights.

Oscine Acquisition

In September 2020, we acquired Oscine Corp. (Oscine), a privately-held early-stage biotechnology company pursing a glial progenitor *ex vivo* cell engineering program, in exchange for $8.5 million in cash, net of certain expenses. We had originally entered into a collaboration, license, and option to purchase agreement with Oscine in November 2018. That agreement was terminated upon the closing of our acquisition of Oscine. As part of the Oscine acquisition, we also agreed to pay additional amounts of up to an aggregate of $225.8 million upon achievement of certain specified development and commercial milestones, which we may pay in cash or in shares of our common stock, subject to certain conditions. As a result of the Oscine acquisition, we entered into, or obtained and amended, licenses to various technologies related to our glial progenitor cell-based therapy program, including a license agreement with University of Rochester and a supply agreement with Hadasit Medical Research Services and Development Ltd. (Hadasit) for access to certain cells and information. We terminated the supply agreement with Hadasit in September 2022 following our decision to cease using the cells and information in our glial progenitor cell-based therapy program.

License Agreement with University of Rochester

Effective as of the closing of the Oscine acquisition, we entered into an amended and restated exclusive license agreement (the Rochester Agreement) with the University of Rochester, which amended and restated a prior license agreement between Oscine and its affiliates and the University of Rochester and assigned Oscine's rights and obligations under the prior license agreement to us. Under the Rochester Agreement, we obtained an exclusive, royalty-bearing, sublicensable, worldwide license under certain patents, and a non-exclusive, royalty-free license under know-how, to research, develop, import, make, have made, use, sell, offer to sell, commercialize, and otherwise exploit cell-based therapies for the treatment of human central nervous system disease and disorders. We utilize these license rights in our glial progenitor cell-based therapy program. We granted the University of Rochester a license to practice any patent rights that cover inventions in the field of cell-based therapies for human central nervous system diseases and disorders, which inventions are first conceived and reduced to practice solely by Dr. Steven Goldman acting in his capacity as our employee, or jointly with any of our employees reporting to Dr. Goldman, solely for Dr. Goldman or any of his laboratory members at the University of Rochester to practice such patent rights within Dr. Goldman's laboratory at the University of Rochester for internal academic research purposes. University of Rochester granted us an automatic royalty-free non-exclusive license, and the option to obtain exclusive rights, to any patent rights or inventions conceived or reduced to practice by Dr. Goldman or members of his laboratory at the University of Rochester within a certain timeframe in connection with the internal academic research license that we granted to the University of Rochester. We are obligated to use commercially reasonable efforts to proceed with the commercial exploitation of the patents, to create a reasonable supply of licensed products to meet demand, and to adhere to a specified commercial development plan for development of stem cell therapy products, with specified development milestones, including obtaining government approvals to market at least one licensed product, and to market such product within twelve months of receiving such approval.

The licenses granted pursuant to the Rochester Agreement are subject to certain rights retained by the University of Rochester and the rights of the United States government. The retained rights of the University of Rochester pertain only to its ability to conduct internal academic research other than clinical research and for teaching, education, and other non-commercial research activities, in publications related to its scientific research and findings, and for any other non-clinical and non-commercial purpose that is not inconsistent with the rights granted to us under the Rochester Agreement. These retained rights do not limit our ability to pursue our programs and product candidates.

Pursuant to the Rochester Agreement, we paid to University of Rochester a minimum annual royalty of $20,000 in January 2024, and are obligated to pay future minimum annual royalties of $20,000 in 2025, $50,000 in each of 2026, 2027, and 2028, and $70,000 in 2029 and each year thereafter. The minimum annual royalty payment is creditable against our obligation to pay tiered royalties on annual net sales in the low single-digits. The royalty rates are also subject to reduction upon certain other events. We are also required to pay University of Rochester up to an aggregate of $950,000 upon the achievement of certain specified development and commercial milestones for each licensed product. In addition, we are required to pay a tiered mid-single-digit to mid-double-digit percentage of revenue arising from any sublicenses granted by us to third parties.

The Rochester Agreement will expire on the last-to-expire of the licensed patents thereunder, which we expect to occur in 2038. We have the right to terminate the Rochester Agreement in its entirety for any reason upon 90 days' prior written notice to the University of Rochester. The University of Rochester may terminate the Rochester Agreement upon our material breach that is not cured within 30 days of receiving written notice thereof or immediately in the event of our bankruptcy. The University of Rochester may also terminate the Rochester Agreement, or at its sole discretion terminate the exclusivity of the license granted, upon our failure to meet the diligence obligations under and cure such failure within 90 days of our receipt of notice thereof, or such longer reasonable time determined by University of Rochester, at its discretion, and subject to a good faith negotiation mechanism included in the Rochester Agreement.

License Agreement with Beam

In October 2021, we entered into an option and license agreement (as amended, the Beam Agreement) with Beam, pursuant to which Beam granted us a non-exclusive license to use Beam's proprietary CRISPR Cas12b nuclease editing technology for a specified number of gene editing targets to research, develop, and commercialize engineered cell therapy products that (i) are directed to certain antigen targets, with respect to our allogeneic T cell programs, or (ii) comprise certain human cell types, with respect to our stem cell-derived programs. We are permitted to use the CRISPR Cas12b system to modify or introduce, *ex vivo*, selected genetic sequences with respect to licensed products. The Beam Agreement excludes any rights to base editing using the CRISPR Cas12b system.

Pursuant to the Beam Agreement, we originally had the option, for a period of one year from the effective date of the Beam Agreement, to select additional antigen targets, with respect to our allogeneic T cell programs, or human cell types, with respect to our stem cell-derived programs, in each case, upon our payment of an option payment of $10 million per antigen target or cell type. We subsequently amended the Beam Agreement in July 2022 to extend the term of the option period and to add certain additional rights to the scope of the license for the purpose of supporting research and development of licensed products, and amended the Beam Agreement again in March 2023 to further extend such option period. In addition, we may (i) until the expiration of such option period, elect to replace an antigen target, with respect to our allogeneic T cell programs, or human cell type, with respect to our stem cell-derived programs (Replacement Right) previously selected by us, and (ii) for a period of three years from the effective date of the Beam Agreement, select new gene editing targets, or replace gene editing targets previously selected by us, with respect to any licensed product (Gene Nomination Right). In each case, our rights with respect to exercise of the option, Replacement Right, or Gene Nomination Right are subject to certain limitations.

Pursuant to the Beam Agreement, we paid Beam an upfront payment of $50.0 million. Additionally, with respect to each licensed product, we will be obligated to pay to Beam up to $65.0 million in specified developmental and commercial milestones. We will also be obligated to pay to Beam an aggregate royalty, including any royalty owed by Beam to its licensor, on a licensed product-by-licensed product and country-by-country basis, in the low to mid-single-digits, subject to reduction in certain circumstances, on net sales of each licensed product until the latest of (i) the expiration of certain patents covering such licensed product in the applicable country, (ii) the date on which any applicable regulatory exclusivity, including orphan drug, new chemical entity, data or pediatric exclusivity, with respect to such licensed product expires in such country, or (iii) the 10th anniversary of the first commercial sale of such licensed product in such country.

Unless earlier terminated by either party, the Beam Agreement will expire on a licensed product-by-licensed product and country-by-country basis upon the expiration of our payment obligations with respect to each licensed product thereunder. We may terminate the Beam Agreement in its entirety or on an antigen target-by-antigen target basis (with respect to licensed product applicable to our allogeneic T cell programs), on a cell type-by-cell type basis (with respect to licensed product applicable to our stem cell-derived programs), or on a licensed product-by-licensed product basis, in each case, upon (i) 90 days' advance written notice, if such notice is provided prior to the first commercial sale of a licensed product, or (ii) 180 days' advance written notice, if such notice is provided after the first commercial sale of a licensed product. Either party may terminate the Beam Agreement with written notice for the other party's material breach if such breaching party fails to timely cure the breach with respect to the country in which such material breach relates. Beam may terminate the Beam Agreement in its entirety if we or our affiliates or sublicensees commence a legal action challenging the validity, patentability, enforceability, or scope of any of the patent rights licensed to us thereunder. Either party also may terminate the Beam Agreement in its entirety upon certain insolvency events involving the other party.

License Agreement with the NIH

In January 2022, we entered into a patent license agreement (the NIH Agreement) with the U.S. Department of Health and Human Services, as represented by The National Cancer Institution, an institute of the National Institutes of Health (the NIH), pursuant to which the NIH granted to us an exclusive, worldwide, commercial license under certain patent rights related to certain fully-human anti-CD22 binders and CD22 CAR constructs comprising such binders for use in certain *in vivo* gene therapy and *ex vivo* allogeneic CAR T cell applications for B cell malignancies. The license grant is subject to customary statutory requirements and reserved rights as required under federal law and NIH requirements. We have the right to grant sublicenses under the licensed patent rights with the NIH's prior consent.

Pursuant to the NIH Agreement, we paid to the NIH an upfront payment of $1.0 million. Additionally, we will be obligated to pay to the NIH (i) up to an aggregate of $9.6 million in specified regulatory, developmental, and commercial milestone payments with respect to each licensed product, and (ii) a payment of $1.0 million upon the assignment of the NIH Agreement to an affiliate upon a change of control. In addition, we are obligated to pay to the NIH (i) a royalty on net sales of licensed products in the low-single-digits, subject to reduction in certain circumstances, and subject to certain annual minimum royalty payments, and (ii) a percentage, ranging from the mid-single-digits to mid-teens, of revenues from sublicensing arrangements. Additionally, if we are granted a priority review voucher by the FDA with respect to a licensed product, we will be obligated to pay to the NIH the greater of (i) $5.0 million or (ii) a percentage in the mid-single-digits of any consideration received for the sale, transfer, or lease of such priority review voucher. We are also obligated to pay to the NIH a percentage in the low-single-digits of the consideration we receive for any assignment of the NIH Agreement to a non-affiliate.

We are obligated to use commercially reasonable efforts to exploit, and make publicly available, inventions developed by the exploitation of the licensed patent rights, including licensed products.

Unless earlier terminated by either party, the NIH Agreement will expire upon expiration of the last-to-expire valid claim in the licensed patent rights. The NIH may terminate the Agreement with written notice for our material breach if we fail to timely cure such breach or upon certain insolvency events involving us. In addition, the NIH may terminate or modify the NIH Agreement, at its option, if the NIH determines that such termination or modification is necessary to meet the requirements for public use specified by federal regulations issued after the effective date of the NIH Agreement, and we do not reasonably and timely satisfy these requirements. We may terminate the NIH Agreement or any licenses in any country or territory upon 60 days' prior written notice.

In Vivo Cell Engineering Platform

Cobalt Acquisition

In February 2019, we acquired all of the outstanding equity interests in Cobalt Biomedicine, Inc. (Cobalt), a privately-held early-stage biotechnology company, in consideration of the issuance of 36.4 million shares of our Series A-2 convertible preferred stock, valued at $136.0 million. Of the 36.4 million shares of Series A-2 convertible preferred stock issued, 12.1 million shares were contingent on the achievement of a pre-specified development milestone, which was achieved in July 2019. Pursuant to the terms and conditions of the Cobalt acquisition agreement, we are obligated to pay to certain former Cobalt stockholders contingent consideration (Cobalt Contingent Consideration) of up to an aggregate of $500.0 million upon our achievement of certain pre-specified development milestones and a success payment (Cobalt Success Payment) of up to $500.0 million, each of which is payable in cash or stock. The Cobalt Success Payment is payable if, at pre-determined valuation measurement dates, our market capitalization equals or exceeds $8.1 billion, and we are advancing a program based on the fusogen technology in a clinical trial pursuant to an IND, or have filed for, or received approval for, a biologics license application or new drug application for a product based on the fusogen technology. A valuation measurement date would also be triggered upon a change of control if at least one of our programs based on the fusogen technology is the subject of an active research program at the time of such change of control. If there is a change of control and our market capitalization is below $8.1 billion as of the date of such change of control, the amount of the potential Cobalt Success Payment will decrease, and the amount of potential Cobalt Contingent Consideration will increase. As a result of the Cobalt transaction, we obtained licenses to various technologies and intellectual property rights that relate to the development of our fusogen technology and related fusosome programs, including exclusive license agreements with Flagship Pioneering Innovations V, Inc. (Flagship) and La Societe Pulsalys (Pulsalys), as well as several exclusive options to enter into exclusive license agreements, including one such option with The Regents of the University of California acting through The Technology Development Group of the University of California, Los Angeles (UCLA), with whom we later entered into an exclusive license agreement.

License Agreement with Flagship

In February 2016, Cobalt entered into an agreement (as amended, the Flagship Agreement) with Flagship, pursuant to which (i) Cobalt irrevocably and unconditionally assigned to Flagship all of its right, title and interest in and to certain foundational intellectual property developed by Flagship Pioneering, Inc. (Flagship Management) during the exploration and/or proto-company phase of Cobalt prior to its spin-out from Flagship (the Managerial Agreement), as set forth in the Flagship Agreement (such foundational intellectual property, the Fusogen Foundational IP), and (ii) Cobalt obtained an exclusive, worldwide, royalty-bearing, sublicensable, transferable license from Flagship under such Fusogen Foundational IP to develop, manufacture, and commercialize any product or process or component thereof, the development, manufacturing and commercialization of which would infringe at least one valid claim of Fusogen Foundational IP absent the license granted under the Flagship Agreement (Fusogen Products) in the field of human therapeutics during the term of the Flagship Agreement. In addition, Flagship irrevocably and unconditionally assigned to Cobalt all of its right, title and interest in and to any and all patents claiming any inventions conceived (i) solely by Flagship Management or jointly by Flagship Management and Cobalt, (ii) after Cobalt's spinout from Flagship, and (iii) as a result of activities conducted pursuant the Managerial Agreement or other participation of Flagship Management in Cobalt's affairs, but excluding Fusogen Foundational IP. We utilize the rights granted by Flagship under the Flagship Agreement in our fusogen platform and related therapeutic product candidates. The license granted to Fusogen Foundational IP is contingent upon Cobalt's compliance with its obligations under the Flagship Agreement. Under the Flagship Agreement, Cobalt also granted Flagship a non-exclusive, worldwide, royalty-free, fully paid, sublicensable license to practice the Fusogen Foundational IP within the field of human therapeutics solely to perform under the Managerial Agreement.

Pursuant to the Flagship Agreement, Cobalt is obligated to pay, on a Fusogen Product-by-Fusogen Product and jurisdiction-by-jurisdiction basis, royalties in the low single-digit percentage on net sales of Fusogen Products. The Flagship Agreement will expire on the expiration of the last-to-expire royalty term, which is determined on a Fusogen Product-by-Fusogen Product and jurisdiction-by-jurisdiction basis, and occurs on the earlier of (i) the expiration of the last valid claim of any Fusogen Foundational IP covering such Fusogen Product or (ii) the date on which the last applicable additional milestone payment has been made in accordance with that certain merger agreement under which we acquired Cobalt, which we expect to be in 2039. Upon expiration of the royalty term with respect to a Fusogen Product in any jurisdiction and payment in full of all amounts owed under the Flagship Agreement for such Fusogen Product, the license granted to us will automatically convert into a non-exclusive, fully paid-up license for such Fusogen Product in such jurisdiction. We have the right to terminate the Flagship Agreement in its entirety for convenience upon 60 days of written notice. Either party may terminate the Flagship Agreement upon a material breach by the other party that is not cured within 30 days after receiving written notice. Also, Flagship may terminate the Flagship Agreement (i) upon 30 days' written notice if we cease to carry on our business with respect to the rights granted in the Flagship Agreement, (ii) upon written notice if we experience an event of bankruptcy, or (iii) immediately upon written notice if we challenge the validity, patentability, or enforceability of any Fusogen Foundational IP or participate in any such challenge.

Sublicense Agreement with Pulsalys

In August 2018, Cobalt entered into an exclusive sublicense agreement (as amended, the Pulsalys Agreement), with Pulsalys, which Cobalt assigned to us in May 2020, and pursuant to which we obtained an exclusive, worldwide, sublicensable sublicense from Pulsalys of the exclusive license granted to Pulsalys by École normale supérieure de Lyon (ENS Lyon) on behalf of itself and Institut National de la Santé et de la Recherche Médicale (Inserm), Centre National de la Recherche Scientifique (CNRS) and Université Claude Bernard Lyon 1 (collectively, the Co-Owners) under certain patent rights relating to methods to selectively modulate the activity of distinct subtypes of immune cells using engineered virus-like particles. In addition, Pulsalys granted us the first right to negotiate an exclusive license to patent rights covering certain improvements to the licensed patent rights that are owned or held by Pulsalys. We utilize the rights granted under the Pulsalys Agreement in our *in vivo* fusogenic platform and related fusosome programs. Under the Pulsalys Agreement, we are obligated to use commercially reasonable efforts to develop and commercialize licensed products, which efforts we can demonstrate by the achievement of the following diligence milestones: (i) incurring a minimum annual spend of $1.0 million for each of the five years after the effective date of the Pulsalys Agreement, and (ii) submitting an IND within a certain period of time, originally five years, after the effective date of the Pulsalys Agreement. In July 2023, we amended the Pulsalys Agreement to extend such five-year period. Under the Pulsalys Agreement, the Co-Owners will retain the right to practice the licensed patent rights for non-commercial research purposes, alone or in collaboration with third parties. These retained rights do not affect our ability to pursue our programs and product candidates.

Pursuant to the Pulsalys Agreement, Cobalt paid Pulsalys an upfront fee of 18,000 EUR. We are required to pay an annual license maintenance fee of 18,000 EUR until the first commercial sale of a licensed product. We are also required to pay Pulsalys up to an aggregate of 575,000 EUR upon the achievement of certain development and regulatory milestones for each of the first three distinct licensed products. In addition, we are obligated to pay an annual royalty in the low single-digits on net sales of the licensed products, with the royalty rate being subject to reduction upon certain events. Lastly, we are obligated to pay percentage annual fees on certain sublicense income in the low single-digits.

The Pulsalys Agreement will expire on a country-by-country and licensed product-by-licensed product basis upon the expiration of the last-to-expire valid claim within the licensed patent rights covering the making, using, sale, and import of such licensed product in such country or any patent term extension or supplementary protection certificate thereof covering the sale of such licensed product in such country, which we expect to occur in 2037. We also have the right to terminate the Pulsalys Agreement in its entirety upon notice if we determine, in our sole discretion, that continued pursuit of development of the licensed patent rights is not feasible or desirable in the context of (i) the resources available to us or due to external factors such as competition, market forces, or access or license to other reasonably useful intellectual property, or (ii) a change of direction of our business focus. Either party may terminate the Pulsalys Agreement upon a material breach by the other party that is not cured within 90 days after receiving written notice thereof. Pulsalys may terminate the Pulsalys Agreement (i) in full in the case of we undergo a cessation of business, dissolution or voluntary liquidation, or (ii) in full or in part (x) if we challenge the validity of the licensed patents, provided that such termination will be with respect to the claims within the licensed patents that are the subject of such challenge, or (y) if we fail to achieve the diligence milestones, and if the parties have not extended such milestones after good faith negotiations, and subject to our ability to cure such failure within 90 days after notice of the same.

License Agreement with UCLA

In March 2019, we entered into a license agreement (as amended, the UCLA Agreement) with UCLA, upon the exercise of an option originally granted by UCLA to Cobalt in April 2018. Under the UCLA Agreement, UCLA granted us an exclusive, sublicensable, transferable (subject to certain conditions) license in the licensed territory in the field of human therapeutics under certain patent rights relating to certain virus envelope pseudotyped lentiviruses and methods of their use to (i) research, make, have made, use, sell, offer for sale, have sold, and import licensed products and (ii) practice licensed methods for the purposes of researching, manufacturing, and using licensed products, but not to perform services for a fee. The licensed territory under the UCLA Agreement is all countries of the world in which the licensed patent rights have or will be filed. UCLA agreed not to grant any rights under the licensed patents regarding licensed methods to third parties without first offering us an opportunity to remove the restrictions regarding the use of licensed methods to perform services for a fee. In addition, we agreed not to commercialize any licensed product that is not administered directly to a patient for therapeutic purposes without first negotiating with UCLA for possible development milestones, royalties, or other payments applicable to such licensed products. We utilize the rights granted under the UCLA Agreement in our *in vivo* fusogenic platform and related fusosome programs. We are obligated to use commercially reasonable and diligent efforts to (i) develop licensed products, (ii) market licensed products, and (ii) manufacture and sell licensed products in quantities sufficient to meet market demand. We are also required to satisfy certain development and commercial milestones with respect to at least one licensed product that is administered directly to a patient for therapeutic purposes.

The license granted pursuant to the UCLA Agreement is subject to certain rights retained by the California Institute for Regenerative Medicine (CIRM) and the United States government, including a non-exclusive, royalty-free license granted to the United States government in accordance with 35 U.S.C. §200-212. If CIRM exercises its rights under Title 17, California Code of Regulations, Section 100600, and the scope of our exclusive license under the UCLA Agreement is impacted, then our financial obligations therein will be reduced by 50%. Otherwise, rights retained by CIRM do not limit our ability to pursue our programs and product candidates. In addition, UCLA retains the right to (i) use the licensed patent rights for educational and research purposes and research sponsored by commercial entities, (ii) publicly disclose research results, (iii) use the licensed patent rights to offer and perform clinical diagnostic and prognostic care solely within the University of California system, and (iv) allow other non-profit and academic institutions to use the licensed patent rights for educational and research purposes and research sponsored by commercial entities, as well as to publicly disclose research results. These retained rights do not affect our ability to pursue our programs and product candidates.

Pursuant to the UCLA Agreement, we paid UCLA an upfront license issue fee of $25,000. We also reimbursed UCLA for its past patent costs, and we have a continuing obligation to reimburse UCLA for its patent costs during the term of the UCLA Agreement. For licensed products that are administered directly to a patient for therapeutic purposes, we are required to pay UCLA up to an aggregate of (i) $825,000 upon the achievement of certain pre-specified development milestones for each of the first three such licensed products, and (ii) $15.0 million upon the achievement of certain pre-specified commercial milestones for such licensed products. In addition, we are obligated to pay an annual license maintenance fee beginning on the first anniversary of the UCLA Agreement until the first commercial sale of a licensed product. The license maintenance fee for the first anniversary was $10,000, and subsequently increases by $10,000 per anniversary up to a maximum annual license maintenance fee of $100,000. We are also required to pay, on a country-by-country basis, earned royalty percentages in the low single-digits on net sales of the licensed products, with the royalty rate being subject to reduction upon certain events. Under the UCLA Agreement, we are obligated to pay a minimum annual royalty of $100,000 beginning with the first full calendar year after the first commercial sale of a licensed product, and the minimum annual royalty will be credited against the earned royalty made during the same calendar year. If any claim within the licensed patent rights is held invalid or unenforceable in a final decision by a court of competent jurisdiction, all royalty obligations with respect to that claim or any claim patentably indistinct from it will expire as of the date of that final decision. No royalties will be collected or paid on licensed products sold to the United States government to the extent required by law, and we will be required to reduce the amount charged for licensed products distributed to the United States government by the amount of the royalty that otherwise would have been paid. Furthermore, we are obligated to pay UCLA tiered fees on a percentage of certain sublicense income in the low single-digit to low double-digit range. Lastly, if we challenge the validity of any licensed patent rights, we agree to pay UCLA all royalties and other amounts due in view of our activities under the UCLA Agreement during the period of challenge. If such challenge fails, we are required to pay two times the royalty rate paid during the period of such challenge for the remaining term of the UCLA Agreement and all of UCLA's verifiable legal out-of-pocket fees and costs incurred in defending against such challenge, including attorney's fees.

The UCLA Agreement will expire on the later of the expiration of the last-to-expire patent or last to be abandoned patent application in the licensed patent rights, which we expect to occur in 2033. We also have the right to terminate the UCLA Agreement in its entirety or with respect to any portion of the licensed patent rights for any reason upon 90 days' prior written notice to UCLA. UCLA may terminate the UCLA Agreement upon a material breach by us that is not cured within 90 days after receiving written notice. If the breach is incapable of being cured within such period, then UCLA will consider our efforts to avoid, and to take reasonable steps to cure, such breach when determining whether to terminate the UCLA Agreement. Also, UCLA has the right and option, at its sole discretion, to either terminate the UCLA Agreement or reduce our exclusive license to a non-exclusive license if we fail to (i) exercise commercially reasonable and diligent efforts to develop, market, manufacture, and sell licensed products, or (ii) achieve certain development milestones set forth in the UCLA Agreement, subject to our ability to extend such milestones in accordance with terms set forth in the UCLA Agreement. Upon our termination of the UCLA Agreement, we may continue to sell any previously manufactured licensed products for 180 days after the effective date of termination. Upon termination of the UCLA Agreement by UCLA for our failure to reimburse UCLA for certain patent costs after the applicable cure period, we may continue to sell all previously made licensed products for 180 days after the effective date of the notice of termination; however, this right is not available if the UCLA Agreement is terminated for any other cause.

Government Regulation

The FDA and other regulatory authorities at federal, state, and local levels, as well as in foreign countries, extensively regulate, among other things, the research, development, testing, manufacture, quality control, import, export, safety, effectiveness, labeling, packaging, storage, distribution, record keeping, approval, advertising, promotion, marketing, post-approval monitoring, and post-approval reporting of biologics such as those we are developing. We, along with third-party contractors, will be required to navigate the various preclinical, clinical and commercial approval requirements of the governing regulatory agencies of the countries in which we wish to conduct studies or seek approval or licensure of our product candidates. The process of obtaining regulatory approvals and the subsequent compliance with applicable federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. Biologics Regulation

In the United States, biological products are subject to regulation under the Federal Food, Drug, and Cosmetic Act, the Public Health Service Act, and other federal, state, local and foreign statutes and regulations. The process required by the FDA before biologics may be marketed in the United States generally involves the following:

- completion of preclinical laboratory tests and animal studies performed in accordance with the FDA's Good Laboratory Practice requirements (GLPs) and other applicable regulations;
- submission to the FDA of an Investigational New Drug application (IND), which must become effective before clinical trials may begin;

- approval by an 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 to satisfy the FDA's legal standards with respect to the safety, purity, and potency of the proposed product candidate, which may include, among other things, demonstrating that the benefits of the product candidate outweigh its known risks for the intended patient population;
- preparation of and submission to the FDA of a biologics license application (BLA), after completion of all pivotal clinical trials;
- satisfactory completion of an FDA Advisory Committee review, if applicable;
- a determination by the FDA within 60 days of its receipt of a BLA to file the application for review;
- satisfactory completion of an FDA pre-approval inspection of the manufacturing facility or facilities at which the proposed product is processed, packed, or held to assess compliance with current Good Manufacturing Practices (cGMP), and to assure that the facilities, methods, and controls will continue to meet the FDA's legal requirements, and, if applicable, to assess compliance with the FDA's current Good Tissue Practice (cGTP) requirements for the use of human cellular and tissue products, and of selected clinical investigation sites to assess compliance with Good Clinical Practices (GCPs); and
- FDA review and approval of the BLA to permit commercial marketing of the product for particular indications for use in the United States.

Prior to beginning the first clinical trial with a product candidate in the United States, we must submit an IND to the FDA. An IND is a request for authorization from the FDA to administer an investigational new drug to humans. The central focus of an IND submission is on the general investigational plan and the protocol(s) for clinical studies. The IND also includes results of animal and *in vitro* studies assessing the toxicology, pharmacokinetics, pharmacology, and pharmacodynamic characteristics of the product; chemistry, manufacturing, and controls information; and any available human data or literature to support the use of the investigational product. An IND must become effective before human clinical trials may begin. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA, within the 30-day time period, raises safety concerns or questions about the proposed clinical trial. In such a case, the IND may be placed on clinical hold and the IND sponsor and the FDA must resolve any outstanding concerns or questions before the clinical trial can begin. Submission of an IND therefore may or may not result in FDA authorization to begin a clinical trial.

In addition to the IND submission process, under the National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules (the NIH Guidelines), 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. 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. Although the NIH Guidelines are not mandatory unless the research in question is being conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH Guidelines voluntarily follow them.

Clinical trials involve the administration of the investigational product to human subjects under the supervision of qualified investigators in accordance with GCPs, which include the requirement that all research subjects provide their informed consent for their participation in any clinical study. Clinical trials are conducted under protocols detailing, among other things, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. A separate submission to the existing IND must be made for each successive clinical trial conducted during product development and for any subsequent protocol amendments. While the IND is active, progress reports summarizing the results of the clinical trials and nonclinical studies performed since the last progress report, among other information, must be submitted at least annually to the FDA, and written IND safety reports must be submitted to the FDA and investigators for serious and unexpected suspected adverse events, findings from other studies suggesting a significant risk to humans exposed to the same or similar drugs, findings from animal or *in vitro* testing suggesting a significant risk to humans, and any clinically important increased incidence of a serious suspected adverse reaction compared to that listed in the protocol or investigator brochure.

Furthermore, an independent IRB for each site proposing to conduct the clinical trial must review and approve the plan for any clinical trial and its informed consent form before the clinical trial begins at that site, and must monitor the study until completed. Regulatory authorities, the IRB, or the sponsor may suspend a clinical trial at any time on various grounds, including a finding that the subjects are being exposed to an unacceptable health risk or that the trial is unlikely to meet its stated objectives. Some studies also include oversight by an independent group of qualified experts organized by the clinical study sponsor, known as a data safety monitoring board, which provides authorization for whether or not a study may move forward at designated check points based on access to certain data from the study and may halt the clinical trial if it determines that there is an unacceptable safety risk for subjects or other grounds, such as no demonstration of efficacy. There are also requirements governing the reporting of ongoing clinical studies and clinical study results to public registries.

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

- Phase 1—The investigational product is initially introduced into healthy human subjects or patients with the target disease or condition. These studies are designed to test the safety, dosage tolerance, absorption, metabolism and distribution of the investigational product in humans, the side effects associated with increasing doses, and, if possible, to gain early evidence on effectiveness.
- Phase 2—The investigational product is administered to a limited patient population with a specified disease or condition to evaluate the preliminary efficacy, optimal dosages and dosing schedule and to identify possible adverse side effects and safety risks. Multiple Phase 2 clinical trials may be conducted to obtain information prior to beginning larger and more expensive Phase 3 clinical trials.
- Phase 3—The investigational product is administered to an expanded patient population to further evaluate dosage, to provide statistically significant evidence of clinical efficacy and to further test for safety, generally at multiple geographically dispersed clinical trial sites. These clinical trials are intended to establish the overall risk/benefit ratio of the investigational product and to provide an adequate basis for product approval.

In some cases, the FDA may require, or companies may voluntarily pursue, additional clinical trials after a product is approved to gain more information about the product. These so-called Phase 4 studies may also be made a condition to approval of the BLA. Concurrent with clinical trials, companies may complete additional animal studies and develop additional information about the biological characteristics of the product candidate, and must finalize a process for manufacturing the product in commercial quantities in accordance with cGMP requirements. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, sponsors must develop methods for testing the identity, strength, quality, and purity of the final product. Additionally, appropriate packaging must be selected and tested, and stability studies must be conducted to demonstrate that the product candidate does not undergo unacceptable deterioration over its shelf life.

BLA Submission and Review by the FDA

Assuming successful completion of all required testing in accordance with all applicable regulatory requirements, the results of product development, nonclinical studies and clinical trials are submitted to the FDA as part of a BLA requesting approval to market the product for one or more indications. The BLA must include all relevant data available from preclinical and clinical studies, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls, and proposed labeling, among other things. Data can come from company-sponsored clinical studies intended to test the safety and effectiveness of a use of the product, or from a number of alternative sources, including studies initiated by independent investigators. The submission of a BLA requires payment of a substantial application user fee to the FDA, unless a waiver or exemption applies.

Within 60 days following submission of the application, the FDA reviews a BLA submitted to determine if it is substantially complete before the FDA accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. Once a BLA has been accepted for filing, the FDA's goal is to review standard applications within ten months after the filing date, or, if the application qualifies for priority review, six months after the FDA accepts the application for filing. In both standard and priority reviews, the review process may also be extended by FDA requests for additional information or clarification. The FDA reviews a BLA for a product candidate to determine, among other things, whether the information provided satisfies the FDA's legal standards with respect to the safety, purity, and potency of the proposed product candidate, which may include, among other things, demonstrating that the benefits of the product candidate outweigh its known risks for the intended patient population. The FDA also reviews a BLA to determine whether the facility in which it is manufactured, processed, packed, or held meets standards designed to assure that the product candidate will continue to meet the FDA's legal requirements. The FDA may also convene an advisory committee to provide clinical insight on application review questions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions.

Before approving a BLA, the FDA will typically inspect the facility or facilities where the product is manufactured. The FDA will not approve an application unless it determines that the manufacturing processes and facilities are in compliance with cGMP and adequate to assure consistent production of the product within required specifications. For a product candidate that is also a human cellular or tissue product, the FDA also will not approve the application if the manufacturer is not in compliance with cGTPs. These are FDA regulations that govern the methods used in, and the facilities and controls used for, the manufacture of human cells, tissues, 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 compliance with GCP.

After the FDA evaluates a BLA and conducts any inspections it deems necessary, the FDA may issue an approval letter or a Complete Response Letter (CRL). An approval letter authorizes commercial marketing of the product with specific prescribing information for specific indications. A CRL will describe all of the deficiencies that the FDA has identified in the BLA, except that where the FDA determines that the data supporting the application are inadequate to support approval, the FDA may issue the CRL without first conducting required inspections, testing submitted product lots, and/or reviewing proposed labeling. In issuing the CRL, the FDA may recommend actions that the applicant might take to place the BLA in condition for approval, including requests for additional information or clarification. The FDA may delay or refuse approval of a BLA if applicable regulatory criteria are not satisfied, require additional testing or information, and/or require post-marketing testing and surveillance to monitor safety or efficacy of a product.

If regulatory approval of a product is granted, such approval will be granted for particular indications and may entail limitations on the indicated uses for which such product may be marketed. For example, the FDA may approve the BLA with a Risk Evaluation and Mitigation Strategy (REMS), to ensure the benefits of the product outweigh its risks. A REMS is a safety strategy implemented to manage a known or potential serious risk associated with a product and to enable patients to have continued access to such medicines by managing their safe use, and could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. The FDA also may condition approval on, among other things, changes to proposed labeling or the development of adequate controls and specifications. Once approved, the FDA may withdraw the product approval if compliance with pre- and post-marketing requirements is not maintained or if problems occur after the product reaches the marketplace. The FDA may require one or more Phase 4 post-market studies and surveillance to further assess and monitor the product's safety and effectiveness after commercialization, and may limit further marketing of the product based on the results of these post-marketing studies.

In addition, the Pediatric Research Equity Act (PREA) requires a sponsor to conduct pediatric clinical trials for most drugs for a new active ingredient, new indication, new dosage form, new dosing regimen, or new route of administration. Under PREA, original BLAs and supplements must contain a pediatric assessment unless the sponsor has received a deferral or waiver. In general, the required assessment must evaluate the safety and effectiveness of the product for the claimed indications in all relevant pediatric subpopulations and support dosing and administration for each pediatric subpopulation for which it is determined that there is substantial evidence that the product provides benefits that outweigh its known and potential risks. The sponsor or FDA may request a deferral of pediatric clinical trials for some or all of the pediatric subpopulations. A deferral may be granted for several reasons, including a finding that the drug is ready for approval for use in adults before pediatric clinical trials are complete or that additional safety or efficacy data need to be collected before the pediatric clinical trials begin. The FDA must send a non-compliance letter to any sponsor that fails to submit the required assessment, keep a deferral current, or submit a request for approval of a pediatric formulation.

Expedited development and review programs

The FDA offers a number of expedited development and review programs for qualifying product candidates. For example, the fast track program is intended to expedite or facilitate the process for reviewing new products that are intended to treat a serious or life-threatening disease or condition and demonstrate the potential to address unmet medical needs for the disease or condition. Fast track designation applies to the combination of the product and the specific indication for which it is being studied. The sponsor of a fast track product has opportunities for more frequent interactions with the applicable FDA review team during product development and, once a BLA is submitted, the product candidate may be eligible for priority review. A fast track product may also be eligible for rolling review, where the FDA may consider for review sections of the BLA on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the BLA, the FDA agrees to accept sections of the BLA and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the BLA.

A product candidate intended to treat a serious or life-threatening disease or condition may also be eligible for breakthrough therapy designation to expedite its development and review. A product candidate can receive breakthrough therapy designation if preliminary clinical evidence indicates that the product candidate, alone or in combination with one or more other drugs or biologics, may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. The designation includes all of the fast track program features, as well as more intensive FDA interaction and guidance beginning as early as Phase 1 and an organizational commitment to expedite the development and review of the product candidate, including involvement of senior managers.

Any marketing application for a drug or biologic submitted to the FDA for approval, including a product candidate with a fast track designation and/or breakthrough therapy designation, may be eligible for other types of FDA programs intended to expedite the FDA review and approval process, such as priority review and accelerated approval. A BLA is eligible for priority review if the product candidate is designed to treat a serious or life-threatening disease or condition, and if approved, would provide a significant improvement in safety or effectiveness compared to available alternatives for such disease or condition. For original BLAs, priority review designation means the FDA's goal is to take action on the marketing application within six months of the 60-day filing date (as compared to ten months under standard review).

Additionally, 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 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 accelerated approval, the FDA will generally require the sponsor to perform adequate and well-controlled confirmatory clinical studies to verify and describe the anticipated effect on irreversible morbidity or mortality or other clinical benefit. Products receiving accelerated approval may be subject to expedited withdrawal procedures if the sponsor fails to conduct the required confirmatory studies in a timely manner or if such studies fail to verify the predicted clinical benefit. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product.

In 2017, the FDA established the regenerative medicine advanced therapy (RMAT) designation as part of its implementation of the 21st Century Cures Act. The RMAT designation program is intended to fulfill the 21st Century Cures Act requirement that the FDA facilitate an efficient development program for, and expedite review of, any drug or biologic that meets the following criteria: (i) the drug or biologic qualifies as a RMAT, which is defined as a cell therapy, therapeutic tissue engineering product, human cell and tissue product, or any combination product using such therapies or products, with limited exceptions; (ii) the drug or biologic is intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition; and (iii) preliminary clinical evidence indicates that the drug or biologic has the potential to address unmet medical needs for such a disease or condition. RMAT designation provides all the benefits of breakthrough therapy designation, including more frequent meetings with the FDA to discuss the development plan for the product candidate and eligibility for rolling review and priority review. Product candidates granted RMAT designation may also be eligible for accelerated approval on the basis of a surrogate or intermediate endpoint reasonably likely to predict long-term clinical benefit, or reliance upon data obtained from a meaningful number of clinical trial sites, including through expansion of trials to additional sites.

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

Orphan drug designation and exclusivity

Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biologic intended to treat a rare disease or condition, defined as a disease or condition with a patient population of fewer than 200,000 individuals in the United States, or a patient population greater than 200,000 individuals in the United States and when there is no reasonable expectation that the cost of developing and making available the drug or biologic in the United States will be recovered from sales in the United States for that drug or biologic. Orphan drug designation must be requested before submitting a BLA. After the FDA grants orphan drug designation, the generic identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA.

If a product that has orphan drug designation subsequently receives the first FDA approval for a particular active ingredient for the disease or condition for which it has such designation, the product is entitled to orphan drug exclusivity, which means that the FDA may not approve any other applications, including a full BLA, to market the same biologic for the same disease or condition for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity or if the FDA finds that the holder of the orphan drug exclusivity has not shown that it can assure the availability of sufficient quantities of the orphan drug to meet the needs of patients with the disease or condition for which the drug was designated. Orphan drug exclusivity does not prevent the FDA from approving a different drug or biologic for the same disease or condition, or the same drug or biologic for a different disease or condition. Among the other benefits of orphan drug designation are tax credits for certain research and a waiver of the BLA application user fee.

A designated orphan drug may not receive orphan drug exclusivity if it is approved for a use that is broader than the disease or condition for which it received orphan designation. In addition, orphan drug exclusive marketing rights in the United States may be lost if the FDA later determines that the request for designation was materially defective or, as noted above, if a second applicant demonstrates that its product is clinically superior to the approved product with orphan exclusivity or the manufacturer of the approved product is unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. Recently, the court in *Catalyst Pharms., Inc. v. Becerra*, 14 F.4th 1299 (11th Cir. 2021) (*Catalyst*) held that orphan drug exclusivity blocks approval of another company's application for the same drug for the entire disease or condition for which the drug is granted orphan drug designation, regardless of whether the drug was approved only for a narrower use or indication. However, in January 2023, the FDA published a notice in the Federal Register in response to the *Catalyst* decision to clarify that while the agency complies with the court's order in *Catalyst*, the FDA intends to continue to apply its longstanding interpretation of the regulations to matters outside of the scope of the *Catalyst* order – that is, the agency will continue tying the scope of orphan drug exclusivity to the uses or indications for which a drug is approved, which permits other sponsors to obtain approval of a drug for new uses or indications within the same orphan-designated disease or condition that have not yet been approved. It is unclear how future litigation, legislation, agency decisions, and administrative actions will impact the scope of the orphan drug exclusivity.

FDA regulation of companion diagnostics

We or our collaborators may develop an in vitro diagnostic (IVD) to identify appropriate patient populations for investigation or use of our product candidates. These diagnostics, often referred to as companion diagnostics, are regulated as medical devices. In the United States, the Federal Food, Drug, and Cosmetic Act and its implementing regulations, and other federal and state statutes and regulations govern, among other things, medical device design and development, preclinical and clinical testing, premarket clearance or approval, registration and listing, manufacturing, labeling, storage, advertising and promotion, sales and distribution, export and import, and post-market surveillance. Unless an exemption applies, diagnostic tests require marketing clearance or approval from the FDA prior to commercial distribution. The two primary types of FDA marketing authorization applicable to a medical device are premarket notification, also called 510(k) clearance (or decision to grant a De Novo classification request if there is no predicate device), and premarket approval (PMA). The FDA classifies medical devices as Class I, Class II, or Class III devices according to their level of risk, with Class III devices being those with the highest risk. This classification of medical devices affects whether the device will require 510(k) clearance or PMA prior to marketing. In January 2024, the FDA announced its plans to reclassify certain high-risk in vitro diagnostics, including companion diagnostics, as Class II devices. As such, to the extent we or our collaborators develop a companion diagnostic, it may be regulated as a Class II or Class III medical device, depending on its intended use and technical characteristics, among other factors.

If use of companion diagnostic is deemed essential to the safe and effective use of a drug product, then the FDA generally will require approval or clearance of the diagnostic contemporaneously with the approval of the therapeutic product. On August 6, 2014, the FDA issued final guidance titled "In Vitro Companion Diagnostic Devices" addressing the development and approval process for such devices. According to the guidance, for novel product candidates, a companion diagnostic device and its corresponding drug candidate should be approved or cleared contemporaneously by the FDA for the use indicated in the therapeutic product labeling. The guidance also explains that a companion diagnostic device used to make treatment decisions in clinical trials of a drug generally will be considered an investigational device unless it is employed for an intended use for which the device is already approved or cleared. If used to make critical treatment decisions, such as patient selection, the diagnostic device may be considered a significant risk device under the FDA's Investigational Device Exemption (IDE) regulations, in which case the sponsor of the diagnostic device will be required to submit and obtain approval of an IDE application and subsequently comply with the IDE regulations. However, according to the guidance, if a diagnostic device and a drug are to be studied together to support their respective approvals, both products can be studied in the same investigational study if the study meets both the requirements of applicable IDE regulations and the IND regulations. The guidance provides that, depending on the details of the study plan and degree of risk posed to subjects, a sponsor may seek to submit an IND alone, or both an IND and an IDE.

510(k) clearance process

To obtain 510(k) clearance, a premarket notification is submitted to the FDA demonstrating that the proposed device is substantially equivalent to a previously cleared 510(k) device or a device that was in commercial distribution before May 28, 1976 for which the FDA has not yet required the submission of a PMA application. The FDA's 510(k) clearance process may take three to 12 months from the date the application is submitted and filed with the FDA, but it may take longer if, among other reasons, the FDA requests additional information, which can significantly prolong the review process. In some cases, the FDA may require clinical data to support substantial equivalence. Notwithstanding compliance with all of the 510(k) clearance requirements, such clearance is never assured.

After a device receives 510(k) clearance, any subsequent modification of the device that could significantly affect its safety or effectiveness, or that would constitute a major change in its intended use, will require a new 510(k) clearance or require a PMA. In addition, the FDA may make substantial changes to industry requirements, including which devices are eligible for 510(k) clearance, which may significantly affect the review and approval process.

De Novo classification process

If a new medical device does not qualify for the 510(k) premarket notification process because no predicate device to which it is substantially equivalent can be identified, the device is automatically classified into Class III. The Food and Drug Administration Modernization Act of 1997 established a different route to market for low- to moderate-risk medical devices that are automatically placed into Class III due to the absence of a predicate device called the "Request for Evaluation of Automatic Class III Designation," or the De Novo classification process. This process allows a manufacturer whose novel device is automatically classified into Class III to request down-classification of its medical device into Class I or Class II on the basis that the device presents low or moderate risk rather than requiring the submission and approval of a PMA. If the manufacturer seeks reclassification into Class II, the manufacturer must include a draft proposal for special controls that are necessary to provide a reasonable assurance of the safety and effectiveness of the medical device. The FDA may reject the reclassification petition if it identifies a legally marketed predicate device that would be appropriate for 510(k) premarket notification or determines that the device is not low- to moderate-risk and requires PMA or that general controls would be inadequate to control the risks and special controls cannot be developed.

PMA process

The PMA process, including the gathering of clinical and preclinical data and the submission to and review by the FDA, can take several years or longer. It involves a rigorous premarket review during which the applicant must prepare and provide the FDA with reasonable assurance of the device's safety and effectiveness and information about the device and its components regarding, among other things, device design, manufacturing, and labeling. PMA applications are subject to an application fee. In addition, PMAs for certain devices must generally include the results from extensive preclinical and adequate and well-controlled clinical trials to establish the safety and effectiveness of the device for each indication for which FDA approval is sought. In particular, for a diagnostic, a PMA application typically requires data regarding analytical and clinical validation studies. As part of the PMA review, the FDA will typically inspect the manufacturer's facilities for compliance with the Quality System Regulation (QSR), which imposes elaborate testing, control, documentation, and other quality assurance requirements. The FDA issued a final rule in February 2024 replacing the QSR with the Quality Management System Regulation (QMSR), which incorporates by reference the quality management system requirements of ISO 13485:2016. The FDA has stated that the standards contained in ISO 13485:2016 are substantially similar to those set forth in the existing QSR. The FDA will begin to enforce the QMSR requirements upon the QMSR effective date of February 2, 2026.

Approval of a PMA submission is not guaranteed, and the FDA may ultimately respond to a PMA submission with a not approvable determination based on deficiencies in the application and require additional clinical trial or other data that may be expensive and time-consuming to generate and that could substantially delay approval. If the FDA's evaluation of the PMA submission is favorable, the FDA typically issues an approvable letter requiring the applicant's agreement to specific conditions, such as changes in labeling or specific additional information, such as submission of final labeling, in order to secure final approval of the PMA. If the FDA's evaluation of the PMA submission or manufacturing facilities is not favorable, the FDA will deny approval of the PMA submission or issue a not approvable letter. A not approvable letter will outline the deficiencies in the application and, where practical, will identify what is necessary to make the PMA approvable. The FDA may also determine that additional clinical trials are necessary, in which case approval of the PMA submission may be delayed for several months or years while the trials are conducted and then the data submitted in an amendment to the submission. If the FDA concludes that the applicable criteria have been met, the FDA will issue a PMA for the approved indications, which may be more limited than those originally sought by the applicant. The PMA can include post-approval conditions that the FDA believes necessary to ensure the safety and effectiveness of the device, including, among other things, restrictions on labeling, promotion, sale, and distribution. Once granted, a PMA may be withdrawn by the FDA if compliance with post-approval requirements, conditions of approval, or other regulatory standards are not maintained or problems are identified following initial marketing.

Obtaining FDA marketing authorization, De Novo down-classification, or approval for medical devices is expensive and uncertain, may take several years, and generally requires significant scientific and clinical data.

Post-approval requirements

Biologics are subject to pervasive and continuing regulation by the FDA, including, among other things, requirements relating to record-keeping, reporting of adverse experiences, periodic reporting, product sampling and distribution, and advertising and promotion of the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims, are subject to prior FDA review and approval. There also are continuing, annual program fees for any marketed products. Biologic manufacturers and their subcontractors are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP, which impose certain procedural and documentation requirements up. Changes to the manufacturing process are strictly regulated, and, depending on the significance of the change, may require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting requirements. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain compliance with cGMP and other aspects of regulatory compliance.

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

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

The FDA closely regulates the marketing, labeling, advertising and promotion of biologics. A company can make only those claims relating to safety and efficacy, purity, and potency that are approved by the FDA and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses. Failure to comply with these requirements can result in, among other things, adverse publicity, warning letters, corrective advertising and potential civil and criminal penalties. Physicians may prescribe legally available products for uses that are not described in the product's labeling and that differ from those tested and approved by the FDA. Such off-label uses are common across medical specialties. Physicians may believe that such off-label uses are the best treatment for many patients in varied circumstances. The FDA does not regulate the behavior of physicians in their choice of treatments. The FDA does, however, restrict manufacturer's communications on the subject of off-label use of their products.

Biosimilars and reference product exclusivity

The Affordable Care Act, signed into law in 2010, includes a subtitle called the Biologics Price Competition and Innovation Act (BPCIA), which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product.

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.

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 that the product meets the FDA's legal standards with respect to safety, purity, and potency, which may include, among other things, demonstrating that the benefits of the product outweigh its known risks. The BPCIA also created certain exclusivity periods for biosimilars approved as interchangeable products. At this juncture, it is unclear whether products deemed "interchangeable" by the FDA will, in fact, be readily substituted by pharmacies, which are governed by state pharmacy law.

A biological product can also obtain pediatric market exclusivity in the United States. Pediatric exclusivity, if granted, adds six months to existing exclusivity periods and patent terms. This six-month exclusivity, which runs from the end of other exclusivity protection or patent term, may be granted based on the voluntary completion of a pediatric study in accordance with an FDA-issued "Written Request" for such a study. The BPCIA is complex and continues to be interpreted and implemented by the FDA. In addition, government proposals have sought to reduce the 12-year reference product exclusivity period. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. As a result, the ultimate impact, implementation, and impact of the BPCIA is subject to significant uncertainty.

Other Healthcare Laws

Pharmaceutical companies are subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which they conduct their business, which may constrain the financial arrangements and relationships through which we conduct research, as well as sell, market and distribute any products for which we obtain marketing approval. Such laws include, without limitation, federal and state anti-kickback, fraud and abuse, false claims, data privacy and security and physician and other health care provider transparency laws and regulations. If our significant operations are found to be in violation of any of such laws or any other governmental regulations that apply, they may be subject to penalties, including, without limitation, administrative, civil and criminal penalties, damages, fines, disgorgement, the curtailment or restructuring of operations, integrity oversight and reporting obligations, exclusion from participation in federal and state healthcare programs and imprisonment.

Coverage and Reimbursement

Sales of any product depend, in part, on the extent to which such product will be covered by third-party payors, such as federal, state, and foreign government healthcare programs, commercial insurance and managed healthcare organizations, and the level of reimbursement for such product by third-party payors. Decisions regarding the extent of coverage and amount of reimbursement to be provided are made on a plan-by-plan basis. These third-party payors are increasingly reducing reimbursements for medical products, drugs, and services. In addition, the U.S. government, state legislatures, and foreign governments have continued implementing cost-containment programs, including price controls, restrictions on coverage and 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 sales of any product. Decreases in third-party reimbursement for any product or a decision by a third-party payor not to cover a product could reduce physician usage and patient demand for the product and also have a material adverse effect on sales.

Healthcare Reform

The United States government and other governments have shown significant interest in pursuing health care reform. Any government-adopted reform measures could adversely impact the pricing of health care products and services in the United States or internationally and the amount of reimbursement available from governmental agencies or other third-party payors. For example, the Patient Protection and Affordable Care Act (the ACA) which was enacted in the United States in 2010, substantially changed the way healthcare is financed by both governmental and private insurers, and significantly affected the pharmaceutical industry. The ACA contains a number of provisions, including those governing enrollment in federal healthcare programs, reimbursement adjustments and changes to fraud and abuse laws. For example, the ACA:

- increased the minimum level of Medicaid rebates payable by manufacturers of brand name drugs from 15.1% to 23.1% of the average manufacturer price;
- expanded the manufacturer Medicaid rebate obligation to drugs paid by Medicaid managed care organizations;

- required manufacturers to participate in a coverage gap discount program, under which they must agree to offer 70 percent point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D; and

- imposed a non-deductible annual fee on pharmaceutical manufacturers or importers who sell "branded prescription drugs" to specified federal government programs.

Since its enactment, there have been judicial, executive, and Congressional challenges to certain aspects of the ACA. On June 17, 2021, the United States Supreme Court dismissed the most recent judicial challenge to the ACA without specifically ruling on the constitutionality of the ACA. Thus, the ACA will remain in force in its current form. Other legislative changes have been proposed and adopted since the ACA was enacted, including reductions of Medicare payments to providers through 2032. The American Rescue Plan Act of 2021 eliminated the statutory Medicaid drug rebate cap. Elimination of this cap may require pharmaceutical manufacturers to pay more in rebates than they receive from the sale of products, which could have a material impact on our business.

Most significantly, on August 16, 2022, President Biden signed the Inflation Reduction Act of 2022 (IRA) into law. This statute marks the most significant action by Congress with respect to the pharmaceutical industry since adoption of the ACA in 2010. Among other things, the IRA requires, beginning in 2026, that manufacturers of certain drugs to engage in price negotiations with Medicare, with prices that can be negotiated subject to a cap; imposes rebates, first due in 2023, under Medicare Part B and Medicare Part D to penalize price increases that outpace inflation; and, beginning in 2025, replaces the Part D coverage gap discount program with a new discounting program. The IRA permits the Secretary of the Department of Health and Human Services to implement many of these provisions through guidance, as opposed to regulation, for the initial years. Various industry stakeholders, including certain pharmaceutical companies and the Pharmaceutical Research and Manufacturers of America, have initiated lawsuits against the federal government asserting that the price negotiation provisions of the IRA are unconstitutional. The impact of these judicial challenges and any future healthcare measures and agency rules implemented by the government on us and the pharmaceutical industry as a whole is unclear. The implementation of cost containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain profitability, or commercialize our product candidates, if approved.

Moreover, there has been recent heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which is likely to continue. Individual states in the United States have also become increasingly active in implementing regulations designed to control pharmaceutical product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. For example, the FDA recently authorized the state of Florida to import certain prescription drugs from Canada for a period of two years to help reduce drug costs, provided that Florida's Agency for Health Care Administration meets the requirements set forth by the FDA. Other states may follow Florida. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our product candidates, if approved, or additional pricing pressures.

Similar political, economic, and regulatory developments are occurring in the European Union (EU) and may affect the ability of pharmaceutical companies to profitably commercialize their products. In addition to continuing pressure on prices and cost containment measures, legislative developments at the EU or member state level may result in significant additional requirements or obstacles. The delivery of healthcare in the EU, including the establishment and operation of health services and the pricing and reimbursement of medicines, is almost exclusively a matter for national, rather than EU, law and policy. National governments and health service providers have different priorities and approaches to the delivery of healthcare and the pricing and reimbursement of products in that context. In general, however, the healthcare budgetary constraints in most EU member states have resulted in restrictions on the pricing and reimbursement of medicines by relevant health service providers. Coupled with ever-increasing EU and national regulatory burdens on those wishing to develop and market products, this could restrict or regulate post-approval activities and affect the ability of pharmaceutical companies to commercialize their products. In international markets, reimbursement and healthcare payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies.

On December 13, 2021, Regulation 2021/2282 on Health Technology Assessment (HTA) amending Directive 2011/24/EU (the Regulation), was adopted. Although the Regulation entered into force in January 2022, it will only begin to apply from January 2025 onward, with preparatory and implementation-related steps to take place in the interim. Once the Regulation becomes applicable, it will have a phased implementation depending on the concerned products. The Regulation intends to boost cooperation among EU member states in assessing health technologies, including new medicinal products, and providing the basis for cooperation at the EU level for joint clinical assessments in these areas. The Regulation will permit EU member states to use common HTA tools, methodologies, and procedures across the EU, working together in four main areas, including joint clinical assessment of the innovative health technologies with the most potential impact for patients, joint scientific consultations whereby developers can seek advice from HTA authorities, identification of emerging health technologies to identify promising technologies early, and continuing voluntary cooperation in other areas. Individual EU member states will continue to be responsible for assessing non-clinical (e.g., economic, social, and ethical) aspects of health technology, and making decisions on pricing and reimbursement.

We expect that additional state, federal, and foreign healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our product candidates once approved or additional pricing pressures.

Employees and Human Capital Resources

As of December 31, 2023, we had 328 employees, 251 of whom were primarily engaged in research and development activities. A total of 179 employees have an advanced degree. None of our employees are represented by a labor union or party to a collective bargaining agreement. We consider our relationship with our employees to be good.

Our human capital resources objectives include, as applicable, identifying, recruiting, retaining, incentivizing, and integrating our existing and additional employees. The principal purposes of our equity incentive plans are to attract, retain, and motivate selected employees, consultants, and directors through the granting of stock-based compensation awards and, with respect to our employees, cash-based performance bonus awards.

In October 2023, we announced a strategic repositioning to increase our focus on our *ex vivo* cell therapy product candidates. As a result, we reduced our near-term investment in our fusogen platform for *in vivo* gene delivery, including by delaying the investigational new drug application submission for our SG299 program and reducing our workforce by approximately 29%.

Our Corporate Information

We were founded in July 2018 as a Delaware corporation. Our principal executive offices are located at 188 East Blaine Street, Suite 400, Seattle, Washington 98102, and our telephone number is (206) 701-7914. Our website address is www.sana.com. The information on, or that can be accessed through, our website is not part of this Annual Report, and is not incorporated by reference herein. We have included our website address as an inactive textual reference only. We may use our website as a means of disclosing material non-public information and for complying with our disclosure obligations under Regulation Fair Disclosure promulgated by the SEC. These disclosures will be included on our website under the “Investors” section.

Item 1A. Risk Factors.

Investing in shares of our common stock involves a high degree of risk. You should carefully consider the following risks and uncertainties, together with all of the other information contained in this Annual Report, including our financial statements and related notes included elsewhere in this Annual Report, before making an investment decision. The risks described below are not the only ones we face. Many of the following risks and uncertainties are, and will continue to be, exacerbated by any worsening of the global geo-political, business, and economic environment. The occurrence of any of the following risks, or of additional risks and uncertainties not presently known to us or that we currently believe to be immaterial, could materially and adversely affect our business, financial condition, reputation, or results of operations. In such a case, the trading price of shares of our common stock could decline, and you may lose all or part of your investment.

Risks Related to Our Business and Industry

Our ex vivo and in vivo cell engineering platforms are based on novel technologies that are unproven and may not result in approvable or marketable products. This uncertainty exposes us to unforeseen risks, makes it difficult for us to predict the time and cost that will be required for the development and potential regulatory approval of our product candidates, and increases the risk that we may ultimately not be successful in our efforts to use and expand our technology platforms to build a pipeline of product candidates.

A key element of our strategy is to identify and develop a broad pipeline of product candidates using our *ex vivo* and *in vivo* cell engineering platforms and advance those product candidates through clinical development for the treatment of various different diseases. The scientific research that forms the basis of our efforts to develop product candidates with our platforms is still ongoing. We are not aware of any FDA-approved therapeutics that are cell products derived from pluripotent stem cells (PSCs) or that utilize our fusogen technology. Further, the scientific evidence that supports the feasibility of developing therapeutic treatments based on our platforms is preliminary, limited, and remains ongoing. We are therefore exposed to a number of unforeseen risks, and it is difficult to predict the types of challenges and risks that we may encounter during development of our product candidates.

Preclinical and clinical testing of product candidates is inherently unpredictable and may lead to unexpected results, in particular when such product candidates are based on novel technologies. For example, we have not tested our cell engineering platforms on all pluripotent and differentiated cell types or in all microenvironments, and results from one cell type or microenvironment may not translate into other cell types or microenvironments. In addition, our current gene editing approaches rely on novel gene editing reagents that may have unanticipated or undesirable effects or prove to be less effective than we expect. Also, we are in the early stages of testing product candidates developed using our cell engineering platforms in humans, and most of our current data are limited to animal models and preclinical cell lines and assays, which may not accurately predict the safety and efficacy of our product candidates in humans. Additionally, we and third parties may have limited preclinical and clinical data, and a more limited understanding generally, with respect to certain indications, including autoimmune diseases, and we cannot predict the extent to which the safety and efficacy of a product candidate may vary across indications. We may encounter significant challenges creating appropriate models and assays for evaluating the safety and purity of our product candidates and may not be able to provide sufficient data or other evidence, to the satisfaction of regulatory authorities, that certain unexpected results observed in preclinical and clinical testing of our product candidates are not indicative of the potential safety issues of such product candidates. In addition, we may use manufacturing reagents and materials across various programs and initiatives. Certain reagents and materials may be novel and have unknown or unanticipated effects, including with respect to a product candidate's safety, efficacy, or manufacturability. Any unanticipated or adverse effects related or attributed to such reagents or materials could affect all the programs and initiatives in which they are used, and result in delays and harm our ability to timely and successfully progress our product candidates through preclinical and clinical development.

We may develop program plans and timelines for certain product candidates based on our experience with such product candidates in different indications or with other product candidates that incorporate or were developed with the same technologies based on our expectation that such product candidates will perform and act similarly. However, our product candidates may reveal unexpected, important differences, including with respect to safety or efficacy, when developed in different indications or as compared to such other product candidates, including differences that may require changes to the manufacturing process or clinical development plan that require additional time and resources beyond what we initially anticipated. Any such occurrence could require us to adjust or alter our development plans, which could delay, harm, or prevent our ability to develop and commercialize such product candidates.

In addition, product candidates developed with our hypoimmune and fusogen technologies have potential safety risks, including those related to genotoxicity associated with the delivery of genome-modifying payloads. For example, DNA sequences that randomly integrate into a cell's DNA may increase the risk for or cause certain cancers. Additionally, gene editing approaches may edit the genome at sites other than the intended DNA target or cause DNA rearrangements, each of which may have oncogenic or other adverse effects. PSC-derived cell products may have potential safety risks related to genomic and epigenomic variations that have occurred or may occur during the manufacturing process. We cannot always predict the types and potential impact of these genomic changes, including whether certain changes are or may eventually be harmful. Accordingly, it may be difficult for us to conduct the level of testing and assay development necessary to ensure that our PSC-derived cell product candidates have an acceptable safety profile when used in humans. These risks related to genetic variation are also relevant to our product candidates created from donor-derived cells. Additionally, our stem cell-based product candidates have potential safety risks that may result from cells that are undifferentiated or have not been completely differentiated to the desired phenotype and lead to oncogenic transformations or other adverse effects. As a result, it is possible that safety events or concerns could negatively affect the development of our product candidates, as described elsewhere in these Risk Factors.

Given the novelty of our technologies, we intend to work closely with the FDA and comparable foreign regulatory authorities to perform the requisite scientific analyses and evaluation of our methods to obtain regulatory approval for our product candidates. However, due to a lack of experience with similar therapeutics or delivery methods, the regulatory pathway with the FDA and comparable foreign regulatory authorities may be more complex, time-consuming, and unpredictable relative to more well-known therapeutics.

For example, even if we obtain human data to support continued evaluation and approval of our product candidates, the FDA or comparable foreign regulatory authorities may lack experience in evaluating the safety and efficacy of therapeutics similar to our product candidates or may scrutinize such data more closely than data generated from more established types of biological products. In addition, given that there are no approved PSC- or donor-derived cell therapy products on the market, the FDA and comparable foreign regulatory authorities have not established consistent standards by which to evaluate the safety of such products, and any such standards that they do establish may subsequently change. Moreover, the FDA remains focused on potential safety issues associated with gene and cell therapy products, and as the number of new gene and cell therapy product candidates submitted for FDA review has increased in recent years, the number of clinical holds imposed by the FDA has also increased. For example, the FDA has placed clinical holds on certain product candidates pending further evaluation of genomic abnormalities detected in as few as a single patient following administration of such product candidates. We cannot be certain that the FDA or comparable foreign regulatory authorities will determine that the potential safety risks associated with our product candidates outweigh the potential therapeutic benefits in each indication for which we develop our products, and that they will allow us to commence clinical trials of such product candidates in a timely manner, or at all, or to continue such clinical trials once they have commenced. If we become subject to a clinical hold with respect to any of our product candidates due to a potential safety issue, we cannot guarantee that we will be able to provide the applicable regulatory authority with sufficient data or other evidence regarding the safety profile of such product candidate such that we will be able to commence or resume clinical development of such product candidates in a timely manner or at all. Any such event could delay clinical development of such product candidate, including in other indications, or our other product candidates, increase our expected development costs, increase the length of the regulatory review process, and delay or prevent commercialization of our product candidates. In addition, the evaluation process for our product candidates will take time and resources and may require independent third-party analyses, and our product candidates may ultimately not be accepted or approved by the FDA or comparable foreign regulatory authorities. As such, even if we are successful in building our pipeline of product candidates from our *ex vivo* and *in vivo* cell engineering platforms, we cannot be certain that such efforts will lead to the development of approvable or marketable products, either alone or in combination with other therapies.

In response to reports of T cell malignancies in patients that previously received chimeric antigen receptor (CAR) T cell immunotherapies, the FDA announced in November 2023 that it is investigating the risk of secondary cancers and the need for regulatory action for such therapies as a class and has advised of new patient monitoring and reporting requirements with respect to such therapies. In January 2024, the FDA imposed a class-wide boxed warning requirement regarding the occurrence of T cell malignancies for all approved CAR T therapies. The FDA has noted that it currently believes that the overall benefits of these therapies continue to outweigh their potential risks for their approved uses. However, all currently approved CAR T cell immunotherapies are approved only in oncology indications, and there can be no assurance that the FDA or comparable foreign regulatory authorities will reach the same risk-benefit determination in other indications, such as autoimmune diseases. We have received and may in the future receive FDA correspondence requesting updates to certain of our CAR T cell clinical trials to address these developments. Additionally, we and our product candidates may be subject to further regulatory actions or requirements of the FDA or comparable foreign regulatory authorities relating to these therapies, such as requiring a black box warning or other labeling disclosures for any approved products. The occurrence of any of the foregoing could increase the cost and complexity of development and commercialization of, and limit the commercial opportunity for, such product candidates, any of which could have a material adverse effect on our business.

If we are unable to successfully identify, develop, and commercialize any product candidates, or experience significant delays in doing so, our business, financial condition, and results of operations will be materially adversely affected.

Our ability to generate revenue from sales of any of our product candidates, which we do not expect to occur for at least the next several years, if ever, will depend heavily on the timely and successful identification, development, regulatory approval, and eventual commercialization of any such product candidates, which may never occur. To date, we have not generated revenue from sales of any products, and we may never be able to develop, obtain regulatory approval for, or commercialize a marketable product. Before we generate any revenue from product sales of any of our current or potential future product candidates, we will need to manage preclinical, clinical, and manufacturing activities, including undertaking significant clinical development, obtain regulatory approval in multiple jurisdictions, establish manufacturing supply, including commercial manufacturing supply, and build a commercial organization, which will require substantial investment and significant marketing efforts. We may never receive regulatory approval for any of our product candidates, which would prevent us from marketing, promoting, or selling any of our product candidates and generating revenue.

The successful development of our product candidates will depend on or be affected by numerous factors, including the following:

- our successful and timely completion of preclinical studies and clinical trials for which the FDA and any comparable foreign regulatory authorities agree with the design, endpoints, and implementation;
- the sufficiency of our financial and other resources to complete the necessary preclinical studies and clinical trials;
- the timely receipt of regulatory approvals or authorizations to conduct clinical trials;
- our ability to timely and successfully initiate, enroll patients in, and complete clinical trials;
- our ability to demonstrate to the satisfaction of the FDA or any comparable foreign regulatory authority that the applicable product candidate meets the FDA's or such comparable foreign regulatory authority's legal standards with respect to safety, purity, and potency, or efficacy, which may include, among other things, demonstrating that the benefits of the product candidate outweigh its known risks for the intended patient population, and that such product candidate can be manufactured in accordance with applicable legal requirements;
- the timely receipt of marketing approvals for our product candidates from applicable regulatory authorities, including the impact of any changes to the FDA's Accelerated Approval Program;
- our ability to address any potential interruptions or delays resulting from external factors, including those related to the current global geo-political, business, and economic environment;
- the extent of any clinical or regulatory setbacks experienced by other companies developing similar products or within adjacent fields, including autologous and allogeneic cell-based therapies and the fields of gene editing and gene therapy, which could negatively impact the perceptions of the value and risk of our product candidates and technologies;
- the extent of any post-marketing approval commitments we may be required to make to applicable regulatory authorities, including the conduct of any post-marketing approval clinical studies, and our ability to comply with any such commitments; and
- our ability to establish, scale up, and scale out, either alone or with CDMOs, manufacturing capabilities for clinical supply of our product candidates for our clinical trials and, if any of our product candidates are approved, commercial supply (including licensure) of such product candidates.

If we experience issues or delays with respect to any one or more of these factors, we could experience significant delays or be unable to successfully develop and commercialize our product candidates, which would materially adversely affect our business, financial condition, and results of operations.

We may not realize the benefits of technologies that we have acquired or in-licensed or will acquire or in-license in the future.

A key component of our strategy is to acquire and in-license technologies to support our mission of using engineered cells as medicines. Our *ex vivo* and *in vivo* cell engineering technologies represent an aggregation of years of innovation and technology from multiple academic institutions and companies, including hypoimmune technology that we licensed from the President and Fellows of Harvard College (Harvard) and The Regents of the University of California (UCSF), our *ex vivo* cell engineering program focused on certain brain disorders that we acquired from Oscine Corp., our fusogen technology that we acquired from Cobalt Biomedicine, Inc. (Cobalt), and gene editing technology that we licensed from Beam Therapeutics Inc., among others. We continue to actively evaluate various acquisition and licensing opportunities on an ongoing basis.

The level of success of these acquisition and in-licensing arrangements, including any that we may enter into in the future, will depend on the risks and uncertainties involved, including:

- unanticipated liabilities related to acquired companies;
- difficulty integrating acquired personnel, technologies, and operations into our existing business;
- difficulty retaining key employees, including of any acquired businesses;
- diversion of management time and focus from operating our business to management of acquisition and integration efforts;
- increases in our expenses and reductions in our cash available for operations and other uses;
- higher than expected acquisition or integration costs;
- disruption in our relationships with collaborators, key suppliers, manufacturers, or customers as a result of an acquisition;
- incurrence of substantial debt or dilutive issuances of equity securities to pay transaction consideration or costs;
- possible write-offs of assets, goodwill or impairment charges, or increased amortization expenses relating to acquired businesses;
- difficulty in and cost of combining the operations and personnel of any acquired business with our own; and
- challenges integrating acquired businesses into our business, including our existing operations and culture.

For example, in October 2023, we underwent a strategic repositioning pursuant to which we updated our portfolio to increase our focus on our *ex vivo* cell therapy product candidates and reduce our near-term investment in our fusogen platform. As part of this reduction, we shifted our focus on fusogen to research activities. We expect to encounter increased costs and difficulties if and when we expand preclinical development and initiate clinical development for product candidates derived from our fusogen platform, including those related to scaling up and driving forward clinical development and manufacturing activities. As a result, there is increased risk that the benefits we expected from the fusogen platform at the time of the Cobalt acquisition may be more expensive and difficult to obtain or may not occur at all.

In addition, foreign acquisitions are subject to additional risks, including those related to integration of operations across different cultures and languages, currency risks, potentially adverse tax consequences of overseas operations, and the particular economic, political, and regulatory risks associated with specific countries. The occurrence of any of these risks or uncertainties may preclude us from realizing the anticipated benefit of any acquisition, and our financial condition may be harmed.

Additionally, we may not be successful in our efforts to acquire or obtain rights to certain technologies or products that are necessary for the success of our product candidates or technologies on acceptable terms or at all, including because we may be unable to successfully or timely negotiate the terms of an agreement with the third-party owner of such technology or products or such third party may have determined to deprioritize such technology or products. Such transactions, as well as other strategic relationships we may enter into, may also be impacted by policies of or actions by certain regulatory authorities, such as the Federal Trade Commission (FTC), that have jurisdiction over various aspects of such transactions and relationships. If we are not able to acquire or obtain rights to certain technologies or products on which certain of our product candidates or technologies may depend, it may be necessary for us to delay, reduce, or curtail the development of such product candidates or technologies, or incur additional costs in order to continue development without such rights.

We may fail to enter into new strategic relationships or may not realize the benefits of any strategic relationships that we have entered into, either of which could materially adversely affect our business, financial condition, commercialization prospects, and results of operations.

Our product development programs and the potential commercialization of our product candidates will require substantial additional cash to fund expenses. In addition, our *ex vivo* and *in vivo* cell engineering platforms are attractive technologies for potential collaborations due to their breadth of application. Therefore, for certain of our product candidates, including product candidates that we may develop in the future, we may decide to form or seek strategic alliances, collaborations, or similar arrangements with pharmaceutical or biotechnology companies that we believe will complement or augment our development and potential commercialization efforts with respect to such product candidates, including in territories outside the United States or for certain indications. We may also pursue joint ventures or investments in complementary businesses that align with our strategy. To the extent we enter into strategic relationships involving companies located outside the United States, we are subject to similar risks to those described elsewhere in these Risk Factors with respect to foreign acquisitions.

We face significant competition in seeking appropriate collaborators. Collaborations are complex and time-consuming to negotiate and document. We may not be successful in our efforts to establish a collaboration or other alternative arrangements for our product candidates on acceptable terms or at all, including because our product candidates may be deemed to be at too early of a stage of development for collaborative effort or third parties may not view our product candidates as having the requisite potential to demonstrate success in clinical trials and ultimately obtain regulatory approval. Additionally, there have been a significant number of recent business combinations among large pharmaceutical companies that have reduced the number of potential future collaborators and changed the strategies of the resulting combined companies. In addition, under the terms of certain license agreements applicable to our product candidates, we may be restricted from entering into collaboration or similar agreements relating to those product candidates on certain terms or at all. If and when we collaborate with a third party for development and commercialization of a product candidate, we expect that we may have to relinquish some or all of the control over the future success of that product candidate to the third party. Our ability to 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 our technologies, product candidates, and market opportunities. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available for collaboration and could determine that such other collaboration is more attractive than a collaboration with us for our product candidate. Similar risks exist with respect to any joint ventures we may pursue, as well as risks and uncertainties related to the costs, time, and other resources required to manage and gain the benefit of any such joint venture, and any potential liabilities we may incur in connection with a joint venture.

In instances where we enter into collaborations, we could be subject to the following risks, each of which may materially harm our business, commercialization prospects, and financial condition:

- collaborators may have significant discretion in determining the efforts and resources that they will apply to a collaboration and may not commit sufficient efforts, funding, and other resources to the development or marketing programs for collaboration product candidates or may misapply those efforts, funding, or resources;
- collaborators may experience financial difficulties, including those that could negatively impact their ability to perform their obligations pursuant to the collaboration agreement, such as funding and development obligations;
- collaborators may not pursue development and commercialization of collaboration product candidates or may elect not to continue or renew development or commercialization programs based on clinical trial results or changes in their strategic focus;
- collaborators may decide or may be required by regulatory authorities to delay clinical trials, 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;
- we may be required to relinquish important rights to our product candidates, such as marketing, distribution, and intellectual property rights;
- we may be required to agree to exclusivity, non-competition, or other terms that restrict our ability to research, develop, or commercialize certain existing or potential future product candidates, including our ability to develop our product candidates in certain indications or geographic regions or combine our product candidates with certain third-party products;
- collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in a way that gives rise to actual or threatened litigation that could jeopardize or invalidate our intellectual property rights or proprietary information or expose us to potential liability;
- collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability;

• collaborators may acquire outside of the collaboration or develop, independently or in collaboration with third parties, including our competitors, products that compete directly or indirectly with our product candidates and may decide to advance such product candidates instead of ours;

• collaborators may own or co-own intellectual property rights covering the product candidates that result from our collaboration, and in such cases, we may not have the exclusive right to commercialize such product candidates;

• we and our collaborators may disagree regarding the development plan for a collaboration product candidate, including, for example, with respect to target indications, inclusion or exclusion criteria for a clinical trial, or the decision to seek approval as front-line therapy versus second-, third-, or fourth-line therapy;

• disputes may arise with our collaborators that could result in the delay or termination of the research, development, or commercialization of the applicable product candidates or costly litigation or arbitration that diverts management attention and resources;

• business combinations or significant changes in a collaborator's business strategy may adversely affect our or the collaborator's willingness to complete our or such collaborator's obligations under the collaboration;

• collaborations may be terminated, which may require us to obtain additional capital to pursue further development or commercialization of the applicable product candidates; or

• we may not achieve the revenue, specific net income, or other anticipated benefits that justify our having entered into, or otherwise led us to enter into, the collaboration.

If our strategic 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. Moreover, our initial estimates of the potential revenue we are eligible to receive under our strategic collaborations may include potential payments related to therapeutic programs for which our collaborators may discontinue development. If we are unable to enter into strategic collaborations, or if any of the other events described in this Risk Factor occur after we enter into a collaboration, we may have to curtail the development of a particular product candidate, reduce or delay the development program for such product candidate or one or more of our other product candidates, delay its potential commercialization or reduce the scope of our 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 will not be able to bring our product candidates to market and generate product revenue.

Our ability to develop our cell engineering platforms and product candidates and our future growth depend on retaining our key personnel and recruiting additional qualified personnel.

Our success depends upon the continued contributions of our key management, scientific, and technical personnel, many of whom have been instrumental for us and have substantial experience with our cell engineering platforms and their underlying technologies and related product candidates. Given the specialized nature of our *ex vivo* and *in vivo* cell engineering technologies and the fact that we are operating in novel and emerging fields, there is an inherent scarcity of personnel with the requisite experience to fill the roles across our organization. As we continue developing our product candidates and building our pipeline, we will require personnel with medical, scientific, or technical qualifications and expertise specific to each program. The loss of key management and senior scientists or other personnel could delay our research and development activities. In addition, the loss of key executives could disrupt our operations and our ability to conduct our business. Despite our efforts to retain valuable employees, all of our employees are at-will employees, and members of our management, scientific, and development teams may terminate their employment with us at any time, with or without notice. Moreover, regulations or legislation impacting our workforce, such as the proposed rule published by the FTC that would, if issued, generally prohibit employers from imposing non-compete obligations on their employees and require employers to rescind existing non-compete obligations, may lead to increased uncertainty in hiring and competition for talent, and harm our ability to protect our company, including our intellectual property, after termination of employment. If our retention efforts are unsuccessful now or in the future, it may be difficult for us to implement our business strategy, which could have a material adverse effect on our business.

Further, certain of our key employees, including Drs. Terry Fry and Steve Goldman, retain partial employment at academic institutions. We may in the future have other employees that have similar employment arrangements. These arrangements expose us to the risk that these individuals may return to their academic positions full-time, devote less of their time or attention to us than is optimal, or potentially expose us to claims of intellectual property ownership or co-ownership by their respective academic institutions.

The competition for qualified personnel in the biotechnology and pharmaceutical industries is intense, and our future success depends upon our ability to attract, retain, and motivate highly skilled employees, including executives, scientists, engineers, clinical operations and manufacturing personnel, and sales professionals. We expect that we may continue to face competition for personnel from other companies, universities, public and private research institutions, and other organizations. We have from time to time experienced, and we expect to continue to experience, difficulty in hiring and retaining qualified employees on acceptable terms, or at all. Many of the companies with which we compete for experienced personnel may have greater resources than we do and may be able to provide prospective job candidates or our existing employees with more attractive roles, salaries, or benefits than we can provide. If we hire employees from competitors or other companies, their former employers may attempt to assert that these employees or we have breached legal obligations, including non-solicitation or non-compete obligations, which may result in a diversion of our time and resources and, potentially, damages. In addition, job candidates and existing employees often consider the value of the stock awards they receive in connection with their employment. If the perceived benefits of our stock awards decline or are otherwise viewed unfavorably compared to those of companies with which we compete for talent, or if we or our prospects are otherwise viewed unfavorably, this could negatively impact our ability to recruit, motivate, and retain highly skilled employees.

As part of our November 2022 and October 2023 restructurings, we reduced our then-current headcount by approximately 15% and 29%, respectively. Reductions in our workforce may result in reduced employee morale and negative publicity, which may damage our reputation and make it more difficult for us to retain and motivate our current personnel as well as attract new personnel. These workforce reductions have also caused us to lose institutional knowledge, capabilities, and subject matter expertise and could negatively affect our efforts to obtain and maintain our intellectual property rights in the event we are unable to identify inventions made or identify or recreate the necessary scientific records or data. Any of the foregoing could significantly harm our business and future growth prospects.

Though many of our personnel have significant experience with respect to manufacturing biopharmaceutical products, we, as a company, do not have experience in developing or maintaining a manufacturing facility. We cannot guarantee that we will be able to maintain a compliant facility and manufacture our product candidates as intended, given the complexity of manufacturing novel therapeutics. If we fail to successfully operate our facility and manufacture a sufficient and compliant supply of our product candidates, our clinical trials and the commercial viability of our product candidates could be adversely affected.

The manufacture of biopharmaceutical products is complex and requires significant expertise, including the development of advanced manufacturing techniques and process controls. Manufacturers of gene and cell therapy products often encounter difficulties in production, particularly in scaling up, scaling out, validating initial production, ensuring the absence of contamination, and ensuring process robustness after initial production. These include difficulties with production costs and yields, quality control, including stability of the product, quality assurance testing, operator error, and shortages of qualified personnel, as well as compliance with strictly enforced federal, state, and foreign regulations. As a result of the complexities involved in biopharmaceutical manufacturing, the cost to manufacture biologics is generally higher than traditional small molecule chemical compounds and the manufacturing process is less reliable and more difficult to reproduce, and this is particularly true with respect to our product candidates. The application of new regulatory guidelines or parameters, such as those related to control strategy testing, may also adversely affect our ability to manufacture our product candidates in a compliant and cost-effective manner or at all.

We continue to invest in building world class capabilities in key areas of manufacturing sciences and operations, including development of our cell engineering platforms, product characterization, and process analytics. Our investments also include scaled research solutions, scaled infrastructure, and novel technologies to improve efficiency, characterization, and scalability of manufacturing, including establishing our internal manufacturing capabilities. However, we have limited experience in managing the manufacturing processes necessary for making cell and gene therapies. We cannot be sure that the manufacturing processes that we use, or the technologies that we incorporate into these processes, will result in viable or scalable yields of *ex vivo* and *in vivo* cell engineering product candidates that will have acceptable safety, purity, and potency, or efficacy, profiles and meet market demand.

A key part of our strategy is operating our own manufacturing capabilities, including our own manufacturing facilities. In June 2022, we entered into a long-term lease to establish and develop our own current good manufacturing practices (cGMP) manufacturing facility in Bothell, Washington (the Bothell facility). In addition, in January 2022, we entered into an agreement with the University of Rochester, pursuant to which we have obtained access to manufacturing capabilities within University of Rochester Medical Center's (URMC) cell-based manufacturing facility (the URMC site) to support manufacturing of product candidates across our portfolio for early-stage clinical trials.

Designing and building out the Bothell facility and the URMC site are time-consuming and require significant resources, including a reallocation of certain of our existing financial, human, and other resources, including the time and attention of our senior management. In addition, given the volatility in the costs of building materials, as well as the impact of rising rates of inflation in recent years and which may occur in the future, building out our manufacturing capabilities may be more expensive than we expect. We do not have experience as a company in developing internal manufacturing capabilities, and we may experience unexpected costs or delays or be unsuccessful in developing our internal manufacturing capabilities in time to support registration-enabling clinical trials of our product candidates or at all. In order to build out the Bothell facility and the URMC site, we will need to continue to engage third-party service providers and obtain equipment and third-party technology necessary to manufacture our product candidates. However, we may not be able to negotiate agreements with third parties or access necessary technologies on commercially reasonable terms or at all. Moreover, there is no guarantee that the space that we are leasing to develop the Bothell facility will not change ownership over the term of the lease or be subject to additional zoning or other restrictions, and that, in such an event, we will be able to continue to build or operate the facility without restriction or further delay or cost.

In addition, operating the Bothell facility and the URMC site will require us to continue to hire and retain experienced scientific, quality control, quality assurance, and manufacturing personnel. As described elsewhere in these Risk Factors, this may be difficult given the intense competition for qualified personnel in the biotechnology and pharmaceutical industries. In addition, though we plan to design and build out our manufacturing capacities at the URMC site, we do not control URMC's cell-based manufacturing facility, nor do we have control over how URMC manages and operates this facility. If URMC does not maintain its cell-based manufacturing facility in accordance with our requirements, we may not be able to manufacture our product candidates in a timely manner or at all, which may delay our ability to commence clinical trials for, obtain regulatory approval for, and commercialize our product candidates.

We currently rely, and expect we will continue to rely, on CDMOs to manufacture our product candidates for preclinical studies and clinical trials. Moreover, it may take us longer to establish and operationalize our Bothell facility than we originally anticipated, which may delay our ability to begin manufacturing certain of our product candidates internally and extend the period of time during which we must solely rely on CDMOs for the manufacture of such product candidates. For example, we may rely on our CDMOs for the potential registration and commercial launch of our first product candidate under our current clinical development timelines, and if there are any delays in our ability to establish and operationalize the Bothell facility, we may be required to rely more heavily on our CDMOs for the potential registrations and commercial launches of additional product candidates as well.

Once we have completed the build-out of the Bothell facility and the URMC site, we may be required to transition manufacturing processes and know-how for certain of our product candidates from our CDMOs to the Bothell facility and the URMC site. To date, we and our CDMOs have limited experience in the technology transfer of manufacturing processes. Transferring manufacturing processes and know-how is complex and involves review and incorporation of both documented and undocumented processes that may have evolved over time. In addition, transferring production to the Bothell facility and the URMC site may require utilization of new or different processes to meet our facility requirements. Additional studies may also need to be conducted to support the transfer of certain manufacturing processes and process improvements. We will not know with certainty whether all relevant know-how and data have been adequately incorporated into the manufacturing process being conducted at our facilities until the completion of studies and evaluations intended to demonstrate the comparability of material previously produced by our CDMOs with that generated by our facilities. Similar risks and considerations apply to the initial technology transfer from us to our CDMOs for manufacturing of pre-clinical and clinical supply, as well as between CDMOs in the event we are required to switch to a new CDMO.

Operating the Bothell facility and the URMC site will require us to comply with complex regulations. Moreover, the Bothell facility, and any future commercial manufacturing facilities we may operate, will require FDA or comparable foreign regulatory authority approval, which we may not obtain in time to support registration-enabling clinical trials for our product candidates, if at all. Even if approved, we would be subject to ongoing periodic unannounced inspections by the FDA, the Drug Enforcement Administration, corresponding state agencies, and comparable foreign regulatory authorities to ensure strict compliance with cGMP, current good tissue practices (cGTPs), and other government regulations. We may be unable to manufacture our product candidates if we fail to meet regulatory requirements and may be unable to scale up or scale out our manufacturing to meet market demand. Any failure or delay in the development of our manufacturing capabilities, including at the Bothell facility and the URMC site, could adversely impact the development and potential commercialization of our product candidates.

We may encounter difficulties in managing our growth if and as we expand our operations, including our development and regulatory capabilities, which could disrupt our operations and otherwise harm our business.

We experienced rapid growth following our inception in July 2018. However, as described elsewhere in these Risk Factors, we undertook workforce reductions as part of our November 2022 and October 2023 restructurings. These workforce reductions may yield unintended consequences and costs, including difficulty retaining and motivating remaining employees, difficulty attracting and hiring qualified employees, and increased reliance on third parties if needed to support our internal capabilities.

Despite our workforce reductions, if we have success in our initial clinical trials, we expect continued growth in the scope of our operations, particularly if and as we advance our product candidates into and through IND-enabling studies and clinical trials and continue to establish and develop our regulatory, quality, and clinical operations and supply chain logistics and manufacturing. To manage our growth, we have implemented and improved, and plan to continue to implement and improve, our managerial, operational, and financial systems, and continue to recruit and train additional qualified personnel. However, due to our limited financial resources and the complexity of managing a company with such growth, we may not be able to effectively manage the expansion of our operations or recruit and train sufficient additional qualified personnel to achieve our business objectives within our desired timelines. The continued expansion of our operations will be costly and may divert our management and business development resources. For example, members of management will have significant added responsibilities in connection with effecting and managing our growth, including identifying, recruiting, integrating, maintaining, and motivating current and future employees, effectively managing our internal development efforts, including the clinical and regulatory (e.g., FDA) review process, while complying with our contractual obligations to third parties, and maintaining and improving our operational, financial, and management controls, reporting systems, and procedures. In addition, as we grow, we may be required to rely more heavily on third-party service providers, which exposes us to risks to which we would not be subject if we performed all work internally, as described elsewhere in these Risk Factors. Our inability to successfully manage our growth could disrupt our operations and otherwise harm our business, including by delaying execution of our programs and business plans.

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 research programs, therapeutic platforms, and product candidates that we identify for specific indications. Additionally, we have contractual commitments under certain of our agreements to use commercially reasonable efforts to develop certain programs and, thus, do not have unilateral discretion to vary from such efforts. In addition, we have contractual commitments to conduct certain development plans, and thus may not have discretion to modify such development plans, including clinical trial designs, without agreement from our partners. As a result, we may forego or delay pursuit of opportunities with other therapeutic platforms or 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. Additionally, we may be required to invest our resources in a limited number of more advanced programs with higher probabilities of success in the shorter term and, consequently, to reduce our investment in promising earlier stage programs. Such decisions would require us to reduce the breadth and diversity of our product portfolio, which could potentially limit the long-term growth of our pipeline and subject us to greater risk that the failure of any such programs would harm our prospects. Our spending on current and future research and development programs, therapeutic platforms, and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing, or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights.

The use of human stem cells exposes us to a number of risks in the development of our human stem cell-derived products, including inability to obtain suitable donor material from eligible and qualified human donors, restrictions on the use of human stem cells, as well as the ethical, legal, and social implications of research on the use of stem cells, any of which could prevent us from completing the development of or commercializing and gaining acceptance for our products derived from human stem cells.

We use human stem cells in our research and development, including induced PSCs (iPSCs) and embryonic stem cells (ESCs), and one or more of our *ex vivo* cell engineering product candidates may be derived from human stem cells. The use of such cells in our research, or as starting cell lines in the manufacture of one or more of our product candidates, exposes us to numerous risks. These risks include difficulties in securing viable, appropriate, and sufficient stem cells as starting material, recruiting patients for our clinical trials, as well as managing a multitude of global legal and regulatory restrictions on the sourcing and use of these cells. For example, to the extent regulatory requirements differ across jurisdictions, we may face increased difficulty finding cells that meet all applicable jurisdictional requirements, or may be required to develop our product candidates using multiple different types of cells, which could increase the complexity and cost of development. In addition, certain cells may be subject to restrictions regarding the patient populations in which the resulting products can be used, which could limit the applicability and value of our product candidates. Further, in some states, use of embryonic tissue as a source of stem cells is prohibited and many research institutions have adopted policies regarding the ethical use of human embryonic tissue. If these regulations, policies, or restrictions have the effect of limiting the scope of research or other activities we can conduct using stem cells, our ability to develop our *ex vivo* cell engineering product candidates may be significantly impaired, which could have a material adverse effect on our business.

Additionally, the use of stem cells generally, and ESCs, in particular, has social, legal, and ethical implications. Certain political and religious groups continue to voice opposition to the use of human stem cells in drug research, development, and manufacturing. Adverse publicity due to ethical and social controversies surrounding the use of stem cells could lead to negative public opinion, difficulties enrolling patients in our clinical trials, increased regulation, and stricter policies regarding the use of such cells, which could harm our business and may limit market acceptance of any of our product candidates that may receive regulatory approval. In addition, clinical experience with stem cells, including iPSCs and ESCs, is limited. We are not aware of any products utilizing iPSCs or ESCs as a starting material that have received marketing approval from the FDA or a comparable foreign regulatory authority. Therefore, patients in our clinical trials may experience unexpected side effects, and we may experience unexpected regulatory delays prior to or, if approval were to be granted, after regulatory approval.

Furthermore, manufacturing and development of our *ex vivo* stem cell-derived and allogeneic T cell-derived product candidates will require that we obtain suitable donor material from eligible and qualified human donors. If we are unable to obtain sufficient quantities of suitable donor material, or if we are unable to obtain such material in a timely manner, we may experience delays in manufacturing our *ex vivo* product candidates, which would harm our ability to conduct clinical trials for or to commercialize these product candidates. Moreover, if the consent, authorization, or process for the donation and use of those materials is not obtained or conducted in accordance with applicable legal, ethical, and regulatory requirements, we could face delays in the clinical testing and approval of these product candidates, or, potentially, we could face claims by such human donors or regulatory authorities, which could expose us to damages and reputational harm.

Negative public opinion and increased regulatory scrutiny of research and therapies involving gene editing or other ex vivo or in vivo cell engineering technologies may damage public perception of our product candidates or adversely affect our ability to conduct our business or obtain regulatory approvals for our product candidates.

Certain aspects of our cell engineering platforms rely on the ability to modify the genome, including by editing genes. Public perception may be influenced by claims that genome modification is unsafe, and products using or incorporating genome modification may not gain the acceptance of the public or the medical community. Similarly, general perceptions of products relying on *ex vivo* or *in vivo* cell engineering techniques may be impacted by developments across the pharmaceutical and biotechnology industries, including those affecting or related to other companies, including those developing products that are similar or within adjacent fields or that are being developed in the same indications. Negative perceptions of genome modification, including gene editing, or of cell or gene therapy products generally, may result in fewer physicians being willing to enroll patients into clinical trials of our product candidates or prescribing our treatments, reduce the willingness of patients to participate in clinical trials of our product candidates or use our treatments, or otherwise negatively impact the development of our product candidates.

In addition, given the novel nature of *ex vivo* and *in vivo* cell engineering technologies, governments may impose import, export, or other restrictions in order to retain control or limit the use of such technologies. Further, in order to further understand the risks of novel genome modification technologies, regulatory authorities may require us to provide additional data prior to allowing clinical testing or commercialization of product candidates that use such technologies, which may cause us to incur additional costs and delay our development plans for certain of our product candidates. Increased scrutiny, negative public opinion, more restrictive government regulations, or enhanced governmental requirements, either in the United States or internationally, would have a negative effect on our business or financial condition and may delay or impair the development and commercialization of our product candidates or demand for such product candidates.

Risks Related to the Development and Clinical Testing of Our Product Candidates

We must successfully progress our product candidates through extensive preclinical studies and clinical trials in order to obtain regulatory approval to market and sell such product candidates. Even if we obtain positive results in preclinical studies of a product candidate, these results may not be predictive of the results of future preclinical studies or clinical trials.

Before an IND or comparable foreign submission can be submitted to the FDA or a comparable foreign regulatory authority and be cleared or otherwise become effective, which is a prerequisite for conducting clinical trials on human subjects, a product candidate must successfully progress through extensive preclinical studies, which include preclinical laboratory testing, animal studies, and formulation studies conducted in accordance with good laboratory practices. In addition, to obtain the requisite regulatory approvals to ultimately market and sell any of our product candidates, we or any future collaborator for such product candidate must satisfy the FDA's or a comparable foreign regulatory authority's legal standards with respect to safety, purity, and potency, or efficacy, which may include, among other things, demonstrating through adequate and well-controlled clinical trials that the benefits of the product candidate outweigh its known risks for the intended patient population.

Preclinical and clinical testing is inherently unpredictable. We may obtain positive data from early research involving our product candidates but subsequently encounter unexpected or unexplained results in preclinical or clinical studies that may cause such product candidates to be unsuitable for further development. We may also need to perform additional research and preclinical or clinical studies for various reasons, including to determine the cause of any unexpected results, including whether such results were caused by our product candidates or other factors, which could delay our development timelines or prevent us from continuing further development at all.

Even if we obtain positive results from preclinical or clinical studies of our product candidates, success in preclinical or clinical studies does not ensure that later preclinical studies or clinical trials will be successful. A number of biotechnology and pharmaceutical companies have suffered significant setbacks in clinical trials, even after positive results in earlier preclinical or clinical studies, such as adverse findings observed while clinical trials were underway or safety or efficacy observations during clinical trials, including previously unreported adverse events, and we cannot be certain that we will not face similar setbacks. The design of a clinical trial can determine whether its results have the potential to support approval of a product, and flaws in a clinical trial's design may not become apparent until the clinical trial is well advanced. In addition, the results of our preclinical animal studies, including our non-human primate (NHP) studies, may not be predictive of the results of subsequent clinical trials involving human subjects. Product candidates may fail to show the desired pharmacological properties or safety and efficacy traits in clinical trials despite having successfully progressed through preclinical studies or earlier clinical trials.

If we fail to obtain positive results in preclinical studies or clinical trials of any product candidate, the development timeline and regulatory approval and commercialization prospects for that product candidate, and, correspondingly, our business and financial prospects, would be negatively impacted.

Preclinical testing of our product candidates may be delayed or otherwise unsuccessful, which would harm our ability to commence and successfully complete clinical trials of, and ultimately commercialize, such product candidates.

Applicable laws and regulations require us to conduct preclinical testing of our product candidates in animals before initiating clinical trials involving humans, and the results and timing of such testing are uncertain. We may experience delays in or difficulty completing studies of our product candidates in animals for various reasons. For example, due to global supply chain issues caused by global geo-political, economic, and other factors beyond our control, as described elsewhere in these Risk Factors, we have experienced and may continue to experience difficulty and increased costs in accessing animal models, specifically certain NHP models, which could delay completion of our preclinical studies involving such models or harm our ability to conduct or complete such studies at all, and could limit the potential patient population for our product candidates.

In addition, animal testing has been the subject of controversy and adverse publicity. Animal rights groups and others have attempted to stop animal testing by pressing for legislation and regulation and by disrupting such testing through protests and other means. To the extent these attempts are successful, our research and development activities may be interrupted or delayed, become more expensive, or both.

We are required to submit an IND or comparable foreign submission to the FDA or comparable foreign regulatory authorities with respect to each product candidate prior to commencing a clinical trial for such product candidate in the applicable jurisdiction. Although we expect our pipeline to yield additional INDs and plan to submit INDs for each of our product candidates, we may not be able to submit future INDs in accordance with our expected timelines for various reasons, including due to:

- manufacturing challenges or delays, including due to challenges associated with scaling up our manufacturing processes and developing and validating assays or otherwise meeting applicable regulatory requirements;
- delays in our IND-enabling preclinical studies; or
- feedback from the FDA that requires us to conduct additional testing or change the design of a planned clinical trial prior to submitting such IND.

Moreover, we cannot guarantee that submission of an IND or comparable foreign submission for a product candidate will result in the FDA or comparable foreign regulatory authorities allowing clinical trials of that product candidate to commence in accordance with our timelines or expectations or at all, or that, once begun, issues will not arise that require suspension or termination of such clinical trials. For example, the FDA or a comparable foreign regulatory authority may accept an IND or comparable foreign submission for a product candidate but place clinical trials of such product candidate on hold pending the results of additional testing or the development of additional assays, or may otherwise refuse or terminate the applicable submission. Further, because legal and regulatory requirements for conducting clinical trials vary across jurisdictions, our receipt of authorization to conduct clinical trials in one jurisdiction does not guarantee such authorization will be granted in other jurisdictions.

In addition, such legal and regulatory requirements may change over time, including in a manner that could cause us to incur delays or additional expense in order to comply. For example, the regulatory landscape related to clinical trials in the European Union (EU) continues to evolve. The EU Clinical Trials Regulation (CTR), which was adopted in April 2014 and repealed the EU Clinical Trials Directive, became applicable on January 31, 2022. Unlike the EU Clinical Trials Directive, which required a separate clinical trial application (CTA) to be submitted to both the competent national health authority and an independent ethics committee in each EU member state in which the clinical trial will be conducted, the CTR provides for a centralized process. The CTR allows sponsors for multi-center trials to make a single submission to both the competent authority and an ethics committee in each member state, leading to a single decision per member state. The CTA assessment procedure has been harmonized as well, including a joint assessment by all member states concerned, and a separate assessment by each member state with respect to specific requirements related to its own territory, including ethics rules. The decision of each EU member state is communicated to the sponsor via the centralized EU portal. Once the CTA is approved, clinical studies may proceed. The CTR foresees a three-year transition period. Compliance with the CTR requirements by us and our service providers, such as CROs, may impact our development plans. For example, because the CTR requires coordination of application review and processing across multiple member states, our ability to commence clinical trials in accordance with our timelines could be delayed. Further, as discussed elsewhere in these Risk Factors, the United Kingdom (UK) withdrew from the EU in 2020, and uncertainty remains as to whether and to what extent certain UK laws and regulations will be aligned with those of the EU, including the CTR, which does not apply in the UK. Local requirements in the UK and the EU have diverged and may further diverge in the future, which could impact any UK clinical and development activities we may conduct. In addition, clinical trial submissions in the UK must be separate from those submitted to EU member states, adding further complexity, cost, and potential risk to any clinical and development activity in the UK.

If we are unable to satisfy applicable legal or regulatory requirements for an IND or comparable foreign submission, or experience delays in doing so, clinical development of our product candidates may be delayed or we may be unable to execute clinical trials of the applicable product candidate in the relevant jurisdiction. For example, we may decide not to submit an IND or comparable foreign submission in certain jurisdictions due to applicable legal or regulatory requirements in such jurisdiction, including based on future changes to such requirements. Additionally, even if regulatory authorities agree with the design and implementation of the clinical trials set forth in an IND or a comparable foreign submission, we cannot guarantee that such regulatory authorities will not change their requirements in the future, which could require us to make costly changes to and delay the conduct of our clinical trials or require suspension or termination of such trials entirely. In addition, because the manufacturing of our product candidates, including our *ex vivo* CAR T cell product candidates, is in its early stages and continues to evolve, we expect that manufacturing-related matters such as chemistry, manufacturing, and controls, including product specifications, will continue to be a focus of regulatory review of our INDs or comparable foreign submissions, which may delay our ability to proceed with the relevant clinical trials. These considerations also apply to new clinical trials we may submit as amendments to existing INDs or comparable foreign submissions.

Clinical drug development is a lengthy and expensive process with uncertain timelines and outcomes. If clinical trials of any of our product candidates are prolonged or delayed, or need to be terminated, we may be unable to obtain required regulatory approvals and commercialize such product candidates on a timely basis or at all.

Clinical trials are expensive, complex, and can take many years to complete, and their outcomes are inherently uncertain and their data subject to varying interpretations and analyses. Product candidates in later-stage clinical trials may fail to produce the same results as observed in earlier trials or fail to show the desired safety and efficacy characteristics despite having progressed through preclinical studies and earlier clinical trials.

We do not know whether our current or future clinical trials will begin on time, need to be redesigned, enroll patients on time, or be completed on schedule, if at all. Clinical trials may be delayed, suspended, or terminated, or may not be able to be conducted at all, for a variety of reasons, including the following:

- delays in or failure to obtain regulatory authorization to commence a trial;
- delays in or failure to obtain institutional review board (IRB) or ethics committee (EC) approval for each clinical trial site;

• delays in or failure to reach agreement with prospective CROs and other service providers, clinical trial sites, or companion diagnostic development partners on acceptable terms, or at all;

• difficulty in recruiting clinical trial investigators or clinical trial sites of appropriate competencies and experience, including due to pre-existing commitments or resource and other infrastructure constraints, including resource allocation to other clinical trials, such as those of our competitors;

• delays in or inability to timely manufacture sufficient quantities of a product candidate for use in clinical trials, including due to lack of sufficient availability of suitable donor material from eligible and qualified donors for the manufacture of our *ex vivo* cell engineering product candidates;

• failure of a product candidate to meet acceptable quality or stability standards, or failure to manufacture product candidates in accordance with cGMP and other applicable laws, regulations, and guidelines;

• delays in establishing the appropriate dosage levels in clinical trials;

• delays in or inability to recruit, enroll, and retain suitable patients in a trial, as discussed elsewhere in these Risk Factors;

• failure of patients to complete a trial or return for post-treatment follow-up;

• difficulty in identifying the sub-populations that are the target group for a particular trial, which may delay enrollment and reduce the power of a clinical trial to detect statistically significant results;

• clinical sites deviating from trial protocol or dropping out of a trial;

• delays caused by the addition of new investigators or clinical trial sites or replacement of existing investigators or sites;

• safety, efficacy, or other concerns arising out of investigator-sponsored clinical trials (ISTs) involving our product candidates or technologies;

• safety or tolerability concerns relating to the product candidate being tested that could cause us or governmental authorities, as applicable, to suspend or terminate a clinical trial or program or impose a clinical hold, including if participants are being exposed to unacceptable health or safety risks or experiencing undesirable side effects, there are other unfavorable characteristics of the product candidate, or regulators deem our product candidate to have the potential for comparable undesirable side effects or risks to those of other product candidates, including those under development by us or third parties, due to compositional, biologic, mechanistic, sourcing, or other similarities;

• the failure of third-party contractors to comply with regulatory requirements or meet their contractual obligations in a timely manner or at all;

• changes in regulatory requirements, policies, and guidelines;

• changes in the treatment landscape for our target indications that may make it more difficult to initiate or recruit patients for our clinical trials in certain jurisdictions or may make our product candidates no longer relevant;

• claims that the product candidate being tested infringes third-party intellectual property rights, including any resulting injunctions that may prevent further use of such product candidates and interfere with the progress of the trial; and

• business interruptions resulting from geo-political actions, including war and terrorism, natural disasters including earthquakes, typhoons, floods, and fires, or disease.

Clinical trials must be conducted in accordance with the FDA's and comparable foreign regulatory authorities' legal requirements, regulations, and guidelines and are subject to oversight by these governmental authorities and IRBs or ECs of the medical institutions where the clinical trials are conducted. We could encounter delays if a clinical trial is suspended or terminated by us, by the IRBs or ECs of the institutions at which such trial is being conducted, by the Data Review Committee or Data Safety Monitoring Board for such trial, or by the FDA or comparable foreign regulatory authorities. Such authorities may impose such a suspension or termination, including following an inspection of clinical trial operations or a clinical trial site, for various reasons, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from use of the product candidate being tested, or changes in governmental regulations or administrative actions.

In addition, the complexity and novelty of certain product candidates, the clinical trial design, and the indications for which such product candidates are being developed, as well as the combination of these factors, could negatively affect our ability to successfully execute and complete clinical trials of such product candidates in accordance with our timelines. For example, clinical trials involving certain indications, such as autoimmune diseases, may require the involvement and alignment of medical professionals across various specialties. Additionally, we may evaluate certain of our product candidates in multiple indications, including in oncology and B-cell-mediated autoimmune diseases, and across a broad range of diseases in a single clinical trial. Because these diseases can vary significantly, doing so may introduce additional complexities and challenges with executing our clinical trials, any of which could increase the time and expense required to commence and complete the applicable trial. Further, to the extent we develop our product candidates for multiple indications, the occurrence of any potential safety issues or significant side effects with respect to a particular indication or study could negatively affect the development of such product candidate in all indications. We and third parties involved in our clinical trials may not have sufficient resources to adequately address such complexities in accordance with our timelines or at all. If we experience delays in completing, or are required to terminate, any clinical trial of our product candidates, the commercial prospects of the relevant product candidates will be harmed, and our ability to generate product revenues from these product candidates will be delayed. In addition, any delays in completing our clinical trials will increase our costs, delay our ability to obtain regulatory approval for the relevant product candidate, and jeopardize our ability to commence product sales and generate revenues. Significant clinical trial delays could also allow our competitors to bring products to market before we do or shorten any periods during which we have the exclusive right to commercialize our product candidates, which may impair our ability to commercialize our product candidates and harm our business and results of operations.

Furthermore, as described elsewhere in these Risk Factors, we rely and will continue to rely on third parties that are responsible for executing or supporting our clinical trials, such as CROs and clinical trial sites, including principal investigators, and to the extent they fail to timely and properly perform their obligations, we may experience program delays, incur additional costs, or both, which may harm our business. In addition, we may experience delays and incur additional costs with respect to clinical trials that we conduct in countries outside the United States, including as a result of increased shipment and distribution costs, compliance with additional regulatory requirements, and the engagement of non-United States-based CROs, and may also be exposed to risks associated with clinical investigators who are unknown to the FDA, and different standards of diagnosis, screening, and medical care.

We will depend on timely and successful enrollment and retention of patients in our clinical trials for our product candidates. If we experience delays or difficulties enrolling or retaining patients in our clinical trials, our research and development efforts and business, financial condition, and results of operations could be materially adversely affected.

Successful and timely initiation and completion of clinical trials will require that we timely enroll and retain a sufficient number of patients. Any clinical trials we conduct may be subject to delays for a variety of reasons, including as a result of patient enrollment taking longer than anticipated, patient withdrawal, or the occurrence of adverse events. These types of developments could cause us to delay the trial or halt further development of the relevant product candidate.

Patient enrollment in clinical trials depends on many factors, including:

- the size and nature of the patient population;
- the severity of the disease under investigation, including patients' prior lines of therapy and treatment;
- eligibility and exclusion criteria for the trial;
- the number and location of clinical trial sites;
- the proximity of patients to clinical sites;
- the design of the clinical protocol;
- the ability to obtain and maintain patient consents;
- competition with other sponsors or clinical trials for clinical trial sites or patients;
- the perceived risks and benefits of the product candidate under evaluation;
- the ability to recruit and availability of clinical trial investigators and sites with the appropriate competencies and experience;
- the risk that enrolled patients will drop out of the trial before administration of the product candidate or trial completion;
- the availability of patients resulting from the impact of any pandemic, epidemic, or disease outbreak;

• the availability of, and clinicians' and patients' satisfaction with, existing and new drugs approved for the indication the clinical trial is investigating; and

• clinicians' and patients' perceptions as to the potential advantages of the product candidate being studied in relation to other available therapies, including any new therapies that may be approved for the indications the clinical trial is investigating or the approved label expansion of an existing therapy into the indication the clinical trial is investigating.

In particular, our clinical trials will compete with other clinical trials that are in the same therapeutic areas as our product candidates. In addition, because the number of qualified clinical investigators and clinical trial sites is limited, we expect to conduct at least some of our clinical trials at the same sites as those used by our competitors. Competition with other clinical trials may reduce the number and types of patients available to participate in our trials, as some patients who might have opted to enroll in our trials may instead opt to enroll in a trial being conducted by one of our competitors. Moreover, enrolling patients in clinical trials for diseases for which there is an approved standard of care is challenging, as patients will first receive the applicable standard of care, and many patients who respond positively to the standard of care do not enroll in clinical trials. In addition, although patients who fail to respond positively to the standard of care treatment may be eligible for clinical trials of our product candidates, treatment with prior regimens may render our product candidates less effective in clinical trials. As a result, the number of eligible patients who have the potential to benefit from our product candidates could be limited, which could extend development timelines or increase costs for our programs.

The circumstances described above and elsewhere in these Risk Factors may make it difficult for us to enroll enough patients to complete our clinical trials in a timely and cost-effective manner. If we are unable to timely recruit and enroll patients for our clinical trials, enroll a sufficient number of patients to complete our clinical trials as planned, or retain patients in our clinical trials, we may be required to change our trial design, recruit and enroll a different population of patients than we anticipated, or recruit and enroll patients in geographies that are more challenging. We may not be fully prepared to address such challenges, and even if we are able to address such challenges, the results of our clinical trials may be negatively impacted. Delays in the completion of any clinical trial we may conduct will increase our costs, slow down the development and approval process, and delay or potentially jeopardize our ability to commence product sales and generate revenue for the relevant product candidate. In addition, some of the factors that may cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates.

Clinical trials may fail to demonstrate that our product candidates, including any future product candidates, or technologies used in or used to develop such product candidates, meet the FDA's or a comparable foreign regulatory authority's requirements with respect to safety, purity, and potency, or efficacy, which would prevent, delay, or limit the scope of regulatory approval and commercialization of such product candidates.

To obtain the requisite regulatory approvals to market and sell any of our current or future product candidates , we or our potential future collaborators must demonstrate with substantial evidence from adequate and well-controlled clinical trials of the product candidate, and to the satisfaction of the FDA or comparable foreign regulatory authorities, that such product candidate meets the FDA's or such comparable foreign regulatory authorities' legal standards with respect to safety, purity, and potency, or efficacy, which may include, among other things, demonstrating through adequate and well-controlled clinical trials that the benefits of the product candidate outweigh its known risks for the intended patient population. Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical development process. Most product candidates that begin clinical trials are never approved by regulatory authorities for commercialization. We may be unable to establish clinical endpoints that applicable regulatory authorities would consider clinically meaningful.

Clinical trials of our product candidates or product candidates developed using our technologies (including those conducted by third parties, such as in the case of ISTs) may not demonstrate that such product candidates or technologies have efficacy and safety profiles necessary to support regulatory approval. Safety or efficacy results for a particular clinical trial, or between different clinical trials of the same product candidate, can vary significantly due to numerous factors, including differences in the size and type of the patient populations, variety of patients and disease types within a trial, changes in and adherence to the clinical trial protocols and trial procedures, and the rate of dropout among clinical trial participants. If the results of clinical trials are inconclusive with respect to the efficacy of our product candidates or those developed using our technologies, if we do not meet the clinical endpoints with statistical and clinically meaningful significance, or if there are safety concerns associated with our product candidates or technologies, we may experience delays in obtaining marketing approval, or we may not obtain approval at all. Additionally, any safety concerns observed in any clinical trial of one of our product candidates, or those developed using our technologies, in our targeted indications could limit the prospects for regulatory approval of such product candidate in those and other indications or the prospects of other product candidates we may develop that are perceived to have the potential for similar safety concerns.

Additionally, some of our trials may be open-label trials in which the patient and/or investigator know whether the patient is receiving the investigational product candidate. Data generated from open-label clinical trials may exaggerate any therapeutic effect, as patients and/or investigators are aware when a patient has received the experimental treatment, which may cause investigators to interpret the information of the treated group more favorably. Therefore, positive results observed in open-label trials may not be replicated in later controlled trials.

Even if we or our collaborators (or other third parties, in the case of ISTs) successfully complete any future clinical trials, clinical data are often susceptible to varying interpretations and analyses. We cannot guarantee that the FDA or comparable foreign regulatory authorities will interpret the results as we do, and more trials could be required before we submit our product candidates for approval. Even if positive results are observed in clinical trials, we cannot guarantee that the FDA or comparable foreign regulatory authorities will view our product candidates as having efficacy. Further, the FDA or comparable foreign regulatory authorities may not agree with our manufacturing strategy or may not find comparability between our clinical trial product candidates and proposed commercial product candidates, which may result in regulatory delays or a need to perform additional clinical studies. Moreover, clinical trial results that may be acceptable to support approval of a certain scope in one jurisdiction may be deemed inadequate to support regulatory approval, or may only be deemed sufficient to support a narrower scope of approval, in other jurisdictions. If the FDA or comparable foreign regulatory authorities determine that the results of clinical trials of our product candidates are not adequate to support approval of a marketing application, we may experience delays in obtaining, or fail to obtain, approval of our product candidates, or we may be required to expend significant additional resources, which may not be available to us, to conduct additional trials in support of potential approval of our product candidates. Even if regulatory approval is obtained for a product candidate, the terms of such approval may limit the scope and use of the specific product candidate, which may also limit its commercial potential.

Our product candidates may cause serious adverse, undesirable, or unacceptable side effects or have other properties that may delay or prevent marketing approval. If a product candidate receives regulatory approval, and such side effects are identified following such approval, the commercial profile of any approved label may be limited, or we may be subject to other significant negative consequences following such approval.

Our product candidates may cause serious adverse, undesirable, or unacceptable side effects, which could cause us or regulatory authorities to interrupt, delay, or halt our future clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or comparable foreign authorities. We do not currently, and in the future may not, have sufficient clinical data or other information to enable us to fully anticipate the side effects of our product candidates. Accordingly, we may observe unexpected side effects or higher levels of expected side effects in clinical trials of our product candidates, including adverse events known to occur in the same classes of therapeutics, such as infusion reaction, cytokine release syndrome, graft-versus-host disease, neurotoxicities, and certain cancers.

Results of our clinical trials could reveal a high and unacceptable severity and prevalence of these or other side effects associated with our product candidates. In such an event, clinical trials of such product candidates could be suspended or terminated, and the FDA or comparable foreign regulatory authorities could order us to cease further development of or deny approval of such product candidates for any or all targeted indications. In addition, the FDA or comparable foreign regulatory authorities may more closely scrutinize any side effects or safety concerns associated with our product candidates in the context of the potential benefits observed in diseases that are not immediately life-threatening, such as certain autoimmune diseases, which could harm our ability to develop or obtain regulatory approval for applicable product candidate in such diseases. Moreover, the occurrence of such side effects could negatively affect our ability to recruit and enroll patients in our clinical trials or the ability of enrolled patients to complete the clinical trials, or result in product liability claims. For example, patients with diseases that are not immediately life-threatening, including certain autoimmune diseases, and their physicians may be less likely to enroll or recommend enrollment in clinical trials of our product candidates if there is a risk of certain side effects or safety concerns and may be more likely to cease their participation in such clinical trials if they experience certain side effects. Similar events may occur if it is determined that there are side effects or safety concerns associated with other products or product candidates that are, or are perceived to be, similar to ours. Any of these occurrences could significantly harm our business, financial condition, and prospects.

Further, clinical trials by their nature involve only a sample of the potential patient population. Because our clinical trials will involve only a limited number of patients and limited duration of exposure to our product candidates, rare and severe side effects of our product candidates may not be apparent during early clinical trials and may only be uncovered once a significantly larger number of patients have been exposed to the product candidate, including during later-stage clinical trials or following commercialization, or when longer-term data is available. As such, even if applicable regulatory authorities initially determine that our product candidates have an acceptable safety profile for their intended use in humans, they may later prove to cause serious side effects in patients that we were unable to observe or predict during their clinical development.

In the event that any of our product candidates receives regulatory approval and we or others later determine that such product may cause undesirable or unacceptable side effects, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw or limit approvals of such product and require us to take such product off the market;
- regulatory authorities may require the addition of labeling statements, specific warnings, or a contraindication or field alerts to physicians and pharmacies, or issue other communications containing warnings or other safety information about the product;
- regulatory authorities may require a medication guide outlining the risks of such side effects for distribution to patients or that we implement a risk evaluation and mitigation strategy (REMS) plan to ensure that the benefits of the product outweigh its risks;
- we may be required to change the therapeutic dose or the way the product is administered, conduct additional clinical trials, or change the labeling of the product;
- we may be subject to limitations on how we may promote or manufacture the product;
- sales of the product may decrease significantly;
- we may be subject to litigation or product liability claims; and
- our reputation may suffer.

Any of these events could prevent us or our potential future partners from achieving or maintaining market acceptance of the affected product or could substantially increase commercialization costs and expenses, which in turn could delay or prevent us from generating significant revenue from the sale of any products.

Interim, topline, or preliminary data from our preclinical studies or clinical trials that we may announce or publish from time to time may change as more data become available or as we make changes to our manufacturing processes. These data are subject to audit and verification procedures that could result in material changes in the final data.

From time to time, we may publicly disclose interim, topline, or preliminary data from our preclinical studies or clinical trials, which are based on a preliminary analysis of then-available data, and the final results and related findings and conclusions are subject to change following a more comprehensive review of the study or trial data. We also make assumptions, estimations, calculations, and conclusions as part of our analyses of data, and we may not have received or had the opportunity to fully and carefully evaluate all data at the time of our initial disclosure of data. Further, modifications or improvements to our manufacturing processes for a product candidate may result in changes to its characteristics or behavior that could cause the product candidate to perform differently and affect the results of our preclinical studies or planned or ongoing clinical trials of such product candidate, and potentially require us to conduct additional preclinical studies or clinical trials. As a result, the topline results that we report may differ from future results of the same studies, or different conclusions or considerations may qualify such results once additional data have been received and fully evaluated. Topline data also remain subject to audit and verification procedures that may result in the final data being materially different from the preliminary data we previously disclosed. As a result, topline data should be viewed with caution until the final data are available. Similarly, preliminary or interim data from clinical trials are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and more patient data become available. Adverse differences between preliminary or interim data and final data could significantly harm our business prospects. Additionally, disclosure of preliminary or interim data by us or our competitors, with respect to clinical trials of their product candidates, could result in volatility in the price of our common stock.

Further, others, including regulatory authorities, investors, or analysts, may not accept or agree with our assumptions, estimates, calculations, conclusions, or analyses, or may interpret or weigh the importance of data, including any decisions we may make based on that data, particularly limited or preliminary data, differently than we do, which could impact the value of the particular program, the approvability or commercialization of the particular product candidate, and our company in general. If the interim, topline, or preliminary data that we report differ from actual results, or if others, including regulatory authorities, investors, or analysts, disagree with the conclusions reached, our ability to obtain approval for and commercialize our product candidates, as well as our business, operating results, prospects, and financial condition, could be harmed.

Our product candidates or technologies may be involved in investigator-sponsored clinical trials, and we will have limited or no control over the conduct of such trials.

ISTs involving our product candidates or technologies pose or are subject to similar risks to those set forth elsewhere in these Risk Factors relating to clinical trials that we conduct ourselves. Although ISTs may provide us with clinical data that can inform the development strategy for our product candidates, we will be unable to control the timing, design, and conduct of such ISTs or regulatory matters with respect to such ISTs, including the submission, clearance or approval, or maintenance of any IND or comparable foreign submission required to conduct such ISTs. In addition, we would not control the data collection and reporting, including timing thereof, with respect to any ISTs, and may not control the manufacturing of the product candidate or technology to be tested in any such ISTs. A delay in the timely completion of or reporting of data from any potential IST, including as a result of manufacturing complications or delays, which could occur for various reasons such as the need to obtain additional licenses, delays in recruiting, enrolling, or retaining patients, or other potential issues, including those described in these Risk Factors, could have a material adverse effect on our ability to further develop our product candidates or to advance our product candidates through subsequent clinical trials. Negative results from an IST could have a material adverse effect on our business and prospects and the perception of our product candidates and technologies. Additionally, there is a possibility that ISTs may be conducted under less rigorous clinical standards than those used in company-sponsored clinical trials. Accordingly, the FDA and comparable foreign regulatory authorities may more closely scrutinize the resulting data and may not view these data as providing adequate support for future clinical trials, whether sponsored by us or third parties. In addition, any potential IST could demonstrate marginal efficacy or reveal clinically relevant safety concerns that could delay the further clinical development or regulatory approval of our product candidates. Further, data from a potential IST may fail to demonstrate efficacy for various reasons, including those unrelated to our product candidates or technologies, which may negatively impact the perception of such product candidates and technologies, despite their potential for future success. To the extent that the results of any ISTs raise safety or other concerns regarding our product candidates or technologies, regulatory authorities may question the results of such ISTs or other clinical trials involving the relevant product candidate or technology. Safety concerns arising from any potential ISTs may cause the FDA or comparable foreign regulatory authorities to impose partial or full clinical holds on our product candidates, including product candidates that were developed using the same technology or manufactured using the same reagents and materials as those product candidates that are the subject of such ISTs, which could delay or prevent us from advancing our product candidates into further clinical development and require us to discontinue our development of such product candidates. The occurrence of any of the foregoing would severely harm our business and prospects.

The manufacture of our product candidates is complex. We or our CDMOs may encounter difficulties in production, which could delay or entirely halt our or their ability to supply our product candidates for clinical trials or, if approved, for commercial sale.

Our product candidates are considered to be biologics, and the process of manufacturing biologics is complex and requires significant expertise and capital investment, including with respect to the development of advanced manufacturing techniques and process controls. As described elsewhere in these Risk Factors, we have entered into a long-term lease to establish manufacturing capabilities at the Bothell facility and have entered into an agreement to access manufacturing capabilities within URMC's cell-based manufacturing facility. We currently rely, and expect to continue to rely, on CDMOs for the manufacture of certain of our product candidates for preclinical and clinical studies. We also anticipate that we will continue to rely on CDMOs for at least some portions of our supply chain following commercialization of any product candidates for which we may receive regulatory approval. As described elsewhere in these Risk Factors, we expect that we will also be required to transition certain manufacturing processes and know-how, including to our CDMOs and to the Bothell facility and the URMC site, over time, which is a complex process with which we have limited experience. If we experience any delays or issues with the foregoing, our ability to begin manufacturing certain of our product candidates internally could be delayed, and we may need to rely to a greater extent on CDMOs for the manufacture of such product candidates for longer than we currently anticipate.

To date, we and our CDMOs have limited experience in manufacturing of cGMP batches of our product candidates. Our CDMOs and, once we begin to operate the Bothell facility and the URMC site, we, must comply with cGMPs and other complex regulations and guidelines applicable to the manufacturing of biologics for use in clinical trials and, if approved, commercial sale, and any inability or failure to comply with such regulations and guidelines could delay our clinical trials or prevent us from being able to commence clinical testing at all. To date, we have not scaled the manufacturing processes with respect to our product candidates for later-stage clinical trials and commercialization, and we and our CDMOs may not have sufficient capacity, resources, or capabilities to scale such manufacturing processes in accordance with our desired timelines or at all. Further, certain of our product candidates may have characteristics that present increased manufacturing complexity and necessitate longer manufacturing timelines. If we are unable to successfully scale the manufacturing process for these product candidates, including in compliance with cGMP quality requirements, or adapt such manufacturing process to meet late-stage development or commercial quality requirements, we may not be able to manufacture sufficient quantities of compliant product candidates, or manufacture them in a timely manner, which would harm our ability to clinically develop and commercialize such product candidates. In addition, the manufacturing of our product candidates, including large-scale manufacturing, may require the development of novel processes for upstream and downstream activities, including analytical technologies, which could cause delays in the scaling of manufacturing, as well as greater costs that could negatively impact the financial viability of our product candidates. We cannot be sure that the manufacturing processes employed by our CDMOs or the technologies that our CDMOs incorporate into our manufacturing processes will result in viable or scalable yields of *ex vivo* and *in vivo* cell engineering product candidates that will have acceptable safety, purity, potency, or efficacy profiles and, if approved, meet market demand.

Our biologic product candidates are susceptible to product loss or reduced manufacturing success rates at various points during the manufacturing process, including due to contamination, equipment damage or failure, including during shipment or storage, failure of equipment to operate as expected, improper installation or operation of equipment, vendor or operator error, damage to, variability of, or improper use of raw materials or consumables necessary for the manufacturing process, inconsistency in yields, variability in product characteristics, and difficulties in scaling the production process. Any of these issues, and even minor deviations from normal manufacturing processes, could result in reduced production yields, product defects, and other supply disruptions and delays. If microbial, viral, or other contaminations are discovered in our product candidates or in the facilities in which our product candidates are manufactured, including the Bothell facility, the URMC site, or any future manufacturing facilities, or those of our CDMOs, such supply may have to be discarded, our products may be withdrawn from clinical trials and, if approved, the market, and such facilities may need to be closed for an extended period of time to investigate and remedy the contamination. Moreover, if the FDA or comparable foreign regulatory authorities determine that we or our CDMOs, or our or our CDMOs' facilities, are not in compliance with applicable laws and regulations, including cGMPs, the FDA or comparable foreign regulatory authority may not approve a biologics license application (BLA) or comparable foreign marketing authorization until the deficiencies are corrected or we replace the manufacturer in our applications with a compliant manufacturer, and we may ultimately be unable to manufacture our product candidates. The occurrence of any of these issues could delay our ability to commence or timely complete clinical development, obtain regulatory approval of, and commercialize our product candidates.

We also may make changes to our manufacturing processes at various points during development, and even after commercialization, for various reasons, such as to control costs, achieve scale, decrease processing time, or increase manufacturing success rate. Such changes carry the risk that they will not achieve their intended objectives, and any of these changes could result in changes to a product candidate's characteristics or behavior or cause our product candidates to perform differently and affect the results of any of our then-ongoing or future preclinical studies or clinical trials, or the performance of the product, once commercialized. In certain circumstances, if we make changes to our manufacturing process for a product candidate, regulatory authorities may require us to perform comparability studies and collect additional preclinical or clinical data prior to undertaking additional clinical trials or obtaining marketing approval for or commercializing the product candidate produced with such modified process. For instance, if we make changes to our manufacturing process for a product candidate during the course of preclinical or clinical development, regulatory authorities may require us to demonstrate the comparability of the product used in preclinical studies, earlier clinical phases, or earlier portions of a trial to the product used in later clinical trials or clinical phases or later portions of a trial, as applicable. If at any point we switch to a different CDMO or supplier of reagents or materials used in the manufacturing process for a product candidate, including, for example, in order to ensure sufficient supply for later-stage clinical trials and potential commercialization, we may also be required to perform comparability studies in order to demonstrate comparability of the applicable product candidate, reagent, or material from the prior CDMO or supplier to that from the new CDMO or supplier, and otherwise demonstrate that the relevant product candidate, reagents, or materials meet the applicable specifications. We may be unable to successfully generate comparability data, and even if we are able to generate and provide such data, regulatory authorities may disagree with the design of our comparability studies or otherwise determine that the data are insufficient to support a determination of comparability. Similarly, we may be unable to demonstrate that the relevant materials meet the applicable specifications. In such an event, we may be required to make further changes to our process or undertake additional preclinical or clinical testing, which could result in manufacturing delays and affect our ability to timely dose patients in our clinical trials, which could delay further development or commercialization of such product candidate, or we may be unable to continue development of the applicable product candidate at all.

Any adverse developments affecting manufacturing operations for any of our product candidates, including those for which we may obtain regulatory approval, may result in shipment delays, inventory shortages, lot failures, product withdrawals or recalls, or other supply interruptions that could negatively impact the conduct of our clinical trials or our ability to successfully commercialize any product candidates for which we may obtain regulatory approval. We may also have to take inventory write-offs and incur other charges and expenses for products that fail to meet specifications as a result of defects or storage over an extended period of time, undertake costly remediation efforts, or seek more costly manufacturing alternatives. Any such issues would harm our ability to timely and successfully complete clinical trials and obtain regulatory approval of our product candidates, which could have a significant negative impact on our business, operations, and prospects.

We are exposed to a number of risks related to the supply chain for the materials required to manufacture our product candidates.

The manufacturing of our product candidates is highly complex and requires sourcing of specialty materials. Many of the risks associated with the complex manufacturing of our final product candidates are applicable to the manufacture and supply of the raw materials required to make such product candidates. In particular, these raw materials are subject to inconsistency in yields, variability in characteristics, contamination, difficulties in scaling the production process, and defects. Similar minor deviations in the manufacturing process for these raw materials could result in supply disruption and reduced production yields for our final product candidates. In addition, we rely on third parties for the supply of these materials, which exposes us to risks associated with dependence on third parties, as described elsewhere in these Risk Factors. Further, we use certain reagents and materials across various programs and initiatives, and any difficulties we experience with such reagents or materials, including with respect to sourcing, quality, or other factors, could have a more significant impact on our portfolio and business than if we used different reagents and materials for each of our programs and initiatives.

We must obtain suitable donor material from eligible and qualified donors for the manufacture of product candidates from our *ex vivo* cell engineering platform. If we are unable to obtain sufficient quantities of suitable donor material in a timely manner or at all, including if we are unable to find donors who meet the eligibility criteria or as a result of geo-political, economic, and other factors beyond our control that may prevent individuals from donating blood, we may experience delays in manufacturing our *ex vivo* product candidates, which would harm our ability to conduct clinical trials of or to commercialize these product candidates.

In addition, we require many reagents, which are drug substance intermediates used in our manufacturing processes to bring about chemical or biological reactions, and other specialty raw and intermediate materials, consumables, and equipment, for our manufacturing processes and for quality control testing of our product candidates, some of which are manufactured or supplied by small companies with limited resources and experience with respect to supporting clinical or commercial biologics production. Some of these suppliers may not have the capacity or resources to support manufacturing of products under cGMP on our timelines or at all or may otherwise be ill-equipped to support our needs, including if and as we expand our manufacturing activities to support later-stage clinical trials and, for any product candidates that may receive regulatory approval, commercialization. Reagents and other key materials from these suppliers may have inconsistent attributes and introduce variability into our manufactured product candidates, which may contribute to variable patient outcomes and possible adverse events. We also do not have supply contracts with many of these suppliers and may not be able to enter into supply contracts with them on acceptable terms or at all. Accordingly, we may experience delays in receiving key reagents, materials, consumables, and equipment to support clinical or commercial manufacturing, which could delay development and commercialization of our product candidates.

For some of these reagents, materials, consumables, and equipment, we and our CDMOs currently rely and may in the future rely on sole source vendors or a limited number of vendors. We may be unable to continue to source reagents, materials, consumables, or equipment from any of these vendors for various reasons, including due to regulatory actions or requirements affecting a vendor, adverse financial or other strategic developments experienced by a supplier, labor disputes or shortages, unexpected demand from other customers and supply limitations, or quality issues. Additionally, due to global geo-political, economic, and other factors beyond our control, there has been, and there are and may continue to be, a shortage of key materials, consumables, and equipment that are necessary to manufacture our product candidates, including certain consumables such as bags, flasks, and pipette tips, which could affect our or our CDMOs' ability to obtain the materials, consumables, and equipment necessary to manufacture our product candidates. If any of the foregoing events were to occur, we may experience delays in manufacturing our product candidates, which would harm our ability to conduct future clinical trials and, if approved, commercialize our products and generate product revenues in a timely manner or at all.

Additionally, as described elsewhere in these Risk Factors, rising rates of inflation in recent years have resulted in substantial increases in the costs associated with manufacturing our product candidates, including the costs of materials, consumables, and equipment, that we are unable to offset. Given the unpredictable nature of the current economic climate, including future rates of inflation, it may be increasingly difficult for us to predict and control our future expenses, which may harm our ability to conduct our business.

As we continue to develop and scale our manufacturing processes, we expect that we will need to obtain rights to and supplies of certain materials and equipment to be used as part of those processes. We may not be able to obtain rights to or sufficient quantities of such materials or equipment on commercially reasonable terms, or at all, and our inability to alter our processes in a commercially viable manner to avoid the use of such materials or equipment or find suitable substitutes would have a material adverse effect on our business. Even if we are able to alter our processes so as to use other materials or equipment, such a change may delay our clinical development or commercialization plans. As described elsewhere in these Risk Factors, if such a change occurs for product candidate that is already being tested in clinical trials, the change may require us to perform comparability studies, demonstrate that the new materials or equipment meet applicable specifications, and collect additional data from patients prior to undertaking more advanced clinical trials.

We may become exposed to costly and damaging liability claims, either when testing our product candidates in clinical trials or at the commercial stage, and our product liability insurance may not cover all damages arising from such claims.

We are exposed to potential product liability and professional indemnity risks that are inherent in the research, development, manufacturing, marketing, and use of pharmaceutical products. The use of our product candidates in clinical trials, and the sale of any products for which we may obtain approval in the future, may expose us to liability claims. These claims might be made by patients that use the product, healthcare providers, pharmaceutical companies, or others selling such products. Any claims against us, regardless of their merit, could be difficult and costly to defend and could materially adversely affect the market for our product candidates or any prospects for commercialization of our product candidates.

Although the clinical trial process is designed to identify and assess potential side effects, it is always possible that a drug, even after regulatory approval, may exhibit unforeseen side effects. Physicians and patients may not comply with any warnings that identify known potential adverse effects or patients who should not use our product candidates. If any of our product candidates were to cause adverse side effects during clinical trials or after approval, we may be exposed to substantial liabilities.

We would require significant financial and management resources to defend against any product liability claims, even if we are successful in such defense. Regardless of the merits or eventual outcome, liability claims may result in decreased demand for our product candidates, negative publicity and injury to our reputation, withdrawal of clinical trial participants, investigations by regulatory authorities, costs to defend the related litigation, diversion of management's time and our resources, substantial monetary awards to clinical trial participants or patients, product recalls, withdrawals, or labeling, marketing, or promotional restrictions, loss of revenue, exhaustion of any available insurance and our capital resources, inability to commercialize our product candidates, and a decline in our share price.

Although we maintain product liability insurance for our product candidates, it is possible that our liabilities could exceed our insurance coverage. We intend to expand our insurance coverage to include the sale of commercial products if we obtain marketing approval for any of our product candidates. However, we may be unable to maintain insurance coverage at a reasonable cost or obtain insurance coverage that will be adequate to satisfy any liability that may arise. If a successful product liability claim or series of claims is brought against us for uninsured liabilities or in excess of insured liabilities, our assets may not be sufficient to cover such claims, and our business operations could be impaired.

Risks Related to Our Dependence on Third Parties

We rely, and expect to continue to expect to rely, on CDMOs, including third-party testing laboratories, to manufacture our product candidates, as well as materials used in the manufacturing of our product candidates, including testing of such product candidates and materials. Any failure by a CDMO to properly produce acceptable materials or product candidates for us or any failure by us or such CDMO to obtain authorization from the FDA or comparable foreign regulatory authorities or otherwise satisfy regulatory requirements with respect to such manufacturing of our product candidates may delay or impair our ability to initiate or complete our clinical trials, obtain regulatory approvals, or commercialize approved products.

We do not currently own or operate any cGMP manufacturing facilities, nor do we have any in-house cGMP manufacturing capabilities. Until we are able to begin manufacturing our product candidates at our Bothell facility, we will rely in part on CDMOs, including third-party testing laboratories, to manufacture our product candidates for use in preclinical and clinical testing and expect to continue to rely on such CDMOs to manufacture certain of our product candidates thereafter as part of our manufacturing strategy.

A limited number of CDMOs specialize in or have the expertise required to manufacture our product candidates or materials used in their manufacture. Moreover, our CDMOs have limited capacity at their facilities and require commitments to secure availability well in advance of manufacturing any products or other materials. Additionally, we face competition from other biopharmaceutical companies to secure manufacturing availability at these facilities. If the CDMOs on which we rely to manufacture our product candidates and other materials do not have sufficient availability at their facilities to do so in accordance with our timelines or are not otherwise able to meet our expected deadlines, we will experience delays in manufacturing our product candidates or other materials necessary for their manufacture. For example, because we rely on, and may continue to rely on, single CDMOs for certain manufacturing activities across multiple programs, any issues we may experience with such a CDMO, including inability to secure manufacturing capacity as and when needed, could result in manufacturing delays across all such programs and harm our ability to timely and successfully complete clinical trials and commercialization of our product candidates. In addition, as described elsewhere in these Risk Factors, we assess and prioritize our programs on an ongoing basis based on various factors. We may not be able to secure manufacturing capacity for certain programs as and when needed and may be required to prioritize manufacturing activities for certain programs over others, which could lead to manufacturing delays and harm our ability to further develop the relevant product candidates. We may also experience similar capacity constraints and manufacturing delays in the future with respect to any products we may manufacture at the Bothell facility. Further, for each new program or CDMO we engage, or in the case of certain changes to the manufacturing process for a product candidate, the relevant manufacturing process and related know-how must be transferred to the CDMO. This technology transfer is time-consuming and complex. If we are required to switch from an existing CDMO to a new CDMO, including to meet cGMP quality requirements or support process lock or larger-scale manufacturing for later-stage clinical trials or potential commercialization, we will need to conduct additional technology transfer activities, which could result in delays in further development of the applicable product candidate.

Our CDMOs also face intense competition to attract and retain qualified personnel. If our CDMOs are unable to attract, retain, and motivate qualified personnel, they may be unable to perform their obligations in a timely manner, or their performance may be substandard or may not meet our quality requirements, which could cause us to experience delays in manufacturing our product candidates. Further, as described elsewhere in these Risk Factors, there are few alternatives for the CDMOs that we currently engage, and even if one of our CDMOs fails to perform according to our expectations and we decide to switch to an alternative CDMO, there is no guarantee that such alternative CDMO will be able to perform its obligations in a timely manner or that its performance will meet our expectations or quality requirements. Any delays in manufacturing our product candidates could materially harm our ability to conduct our clinical trials or commercialize our product candidates in a timely manner or at all and could harm our business.

In addition, we rely on multiple CDMOs to produce sufficient quantities of materials required for the manufacture of our product candidates for preclinical testing and clinical trials and intend to continue to rely on such CDMOs for the commercial manufacture of certain of our products, if approved. Global supply chain shortages and rising rates of inflation in recent years have resulted in substantial increases in the costs of materials, including raw materials, reagents, consumables, and equipment that are required to make or used in the manufacture of our product candidates. If we are unable to obtain such items from third-party sources, or fail to do so on commercially reasonable terms, we may not be able to produce sufficient supply of product candidate or we may be delayed in doing so. Such inability or failure, or any substantial delay in obtaining such items, could materially harm our business.

We rely on third parties to produce certain reagents and biological materials that are used in our discovery and development programs. These materials can be difficult to produce and occasionally have variability from our product specifications. If these materials do not comply with our product specifications, or in the event of any other disruption in the supply of these materials, our business could be materially adversely affected. Although we have control processes and screening procedures, biological materials are susceptible to damage and contamination and may contain active pathogens. Our suppliers may also have low yield from manufacturing batches of these materials, which could increase our costs and slow our development timelines. Improper storage of these materials, by us or any third-party suppliers, may require us to destroy some of these materials or product candidates generated using such materials.

Reliance on CDMOs entails additional risks to which we would not be subject if we manufactured product candidates ourselves, including those applicable to other third-party service providers, as described elsewhere in these Risk Factors. In particular, such risks include reliance on the CDMO for regulatory compliance and quality control and assurance, including compliance with cGMP requirements and comparable standards relating to methods, facilities, and controls used in the manufacturing, processing, testing, and packing of product candidates, which are intended to ensure that biological products have acceptable safety profiles and that they consistently meet applicable requirements and specifications, and our CDMOs may be unable to satisfy applicable compliance and quality requirements in accordance with our timelines or at all. Additional risks include reliance on the CDMO for volume production, the possibility of breach of or inability to perform its obligations under the manufacturing agreement by the CDMO (including a failure to synthesize and manufacture our product candidates in accordance with our product specifications, failure to properly scale-up manufacturing processes, or failure to deliver sufficient quantities of product candidates in a timely manner), and the possibility of termination or nonrenewal of the agreement by the CDMO at a time that is costly or damaging to us. For example, certain of our CDMOs may be unable to manufacture sufficient supply of our product candidates or materials used in their manufacture, in particular, if and as we implement commercial cGMP practices or scale up manufacturing for later-stage clinical trials and potential commercialization. If we experience any issues with respect to the risks described above, we may be required to seek a replacement CDMO, which could require significant internal resources, delay our ongoing manufacturing activities, and ultimately be unsuccessful. If we were unable to timely find an adequate replacement for our CDMOs or another acceptable solution when needed, our clinical trials could be delayed, or our commercial activities could be harmed. In addition, because we depend on our CDMOs, our suppliers, and other third parties for the manufacture, filling, storage, and distribution of our product candidates, we may be unable to prevent or control manufacturing defects in our products, the use or sale of which could seriously harm our business, financial condition, and results of operations. Issues involving any of the foregoing risks could increase our costs, delay our development timelines, and ultimately lead to a delay in, or failure to obtain, regulatory approval of our product candidates.

Pharmaceutical manufacturers are required to register their facilities and products manufactured at the time of submission of the marketing application and then annually thereafter with the FDA and certain state and foreign agencies. If the FDA or a comparable foreign regulatory authority does not approve our CDMO's facilities for the manufacture of our product candidates or if it withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for, or market our product candidates, if approved, on a timely basis or at all. Any discovery of problems with a product, or a manufacturing or laboratory facility used by us or our strategic partners in connection with manufacturing of that product, may result in restrictions on the product or on the relevant facility, including marketed product recall, suspension of manufacturing, product seizure, or a voluntary withdrawal of the drug from the market. We may have little to no control regarding the occurrence of any such incidents at our CDMOs.

Pharmaceutical manufacturers are also subject to extensive post-marketing oversight by the FDA and comparable regulatory authorities in the jurisdictions where a product is marketed, including periodic unannounced and announced inspections by the FDA to assess compliance with cGMP requirements. Any failure by one of our CDMOs to comply with cGMP or to provide adequate and timely corrective actions in response to deficiencies identified in a regulatory inspection could result in further enforcement action that could lead to a shortage of products and harm our business, including withdrawal of approvals previously granted, seizure, injunction, or other civil or criminal penalties. The failure of a CDMO to address any concerns raised by the FDA or comparable foreign regulatory authorities could also lead to plant shutdown or the delay or withholding of product approval by the FDA in additional indications or by comparable foreign regulatory authorities in any indication. In addition, because our CDMOs also provide manufacturing services to other companies, including our competitors, there is a risk that our CDMOs may experience the issues described in this Risk Factor with respect to such third parties and their product candidates as well. The occurrence of any such issues could restrict, partially or completely, or otherwise negatively impact such CDMO's ability to timely and successfully perform its obligations for us with respect to our own product candidates, which would harm our ability to continue manufacturing and commercialize such product candidates. Certain countries may impose additional requirements on the manufacturing of drug products or drug substances, and on manufacturers, as part of the regulatory approval process for products in such countries. The failure by our CDMOs to satisfy such requirements could impact our ability to obtain or maintain approval of our products in such countries. In addition, as described elsewhere in these Risk Factors, our CDMOs may be subject to various other laws and regulations, compliance with or the effect of which could harm our relationship with such CDMOs and negatively impact our business.

If we are unable to obtain sufficient raw and intermediate materials on a timely basis or if we experience other manufacturing or supply interruptions or difficulties, we may be unable to resume supply of such materials or other manufacturing activities within a reasonable time frame and at an acceptable cost or at all, which could materially adversely affect our business.

The manufacture of our product candidates requires the timely delivery of sufficient amounts of raw and intermediate materials. We purchase, and rely on our CDMOs to purchase, certain of these materials from third-party suppliers in order to produce our product candidates for our preclinical studies. There are a limited number of suppliers of these materials, and we may need to assess alternate suppliers to prevent possible disruption of manufacturing of our product candidates for our preclinical studies, our future clinical trials, and if ultimately approved, commercial sale. We rely, and expect to continue to rely, on our CDMOs to purchase materials in order to produce product candidates for our clinical trials; however, we do not have any control over the process or timing of the acquisition of these materials by our CDMOs or the costs of such materials. We work closely with our CDMOs and suppliers, as applicable, to ensure the continuity of supply, but we cannot ensure that these efforts will always be successful. Further, although we strive to diversify our sources of raw and intermediate materials, in certain instances we acquire raw and intermediate materials from a sole supplier. We cannot be sure that these suppliers will remain in business, or that they will not be purchased by one of our competitors or another company that is not interested in continuing to supply these materials for our intended purpose. Alternative sources of supply may exist when we rely on sole supplier relationships, but we cannot ensure that, if needed, we would be able to quickly establish additional or replacement sources for some materials. The lead time needed to establish a relationship with a new supplier can be lengthy, and we may experience delays in the event a new supplier must be used. In addition, the time and effort to qualify a new supplier could result in additional costs, diversion of resources, or reduced manufacturing yields, any of which would negatively impact our operating results. Although we generally would not begin a clinical trial unless we believe we have a sufficient supply of a product candidate to complete the clinical trial, any significant delay in the supply of a product candidate, or the raw or intermediate material components thereof, for an ongoing clinical trial due to the need to replace a supplier could considerably delay completion of our clinical trials, product testing, and potential regulatory approval of our product candidates. Moreover, we currently do not have any agreements for the commercial supply of these raw or intermediate materials. A reduction or interruption in supply of raw or intermediate materials combined with an inability of us or our CDMOs to timely establish alternative sources for such supply could adversely affect our ability to manufacture our product candidates or approved products in a timely or cost-effective manner, result in a shortage of product supply, delay the development and any commercial launch of our product candidates, and ultimately impair our ability to generate revenues from sales of any approved products.

We rely, and expect to continue to rely, on third parties, including service providers such as CROs, clinical trial sites, including principal investigators, and independent clinical investigators, to conduct or support our preclinical studies and clinical trials. If these third parties do not successfully carry out their contractual duties, comply with applicable regulatory requirements, or meet expected deadlines, we may not be able to obtain regulatory approval for or commercialize our product candidates and our business could be substantially harmed.

We rely, and expect to continue to rely, on third parties, including service providers such as CROs, independent clinical investigators, and clinical trial sites, to properly and timely execute or support our preclinical studies and clinical trials and related activities, and to monitor and manage data for our ongoing preclinical and clinical programs and we may rely to a greater extent on such outsourced activities following our October 2023 workforce reduction. However, we are only able to control certain aspects of the activities of these third parties to the extent set forth under our contracts with these third parties, and we have limited influence over their actual performance. Nevertheless, we are responsible for ensuring that each of our preclinical studies and clinical trials is conducted in accordance with the applicable protocol and legal, regulatory, and scientific standards and rules, and our reliance on these third parties does not relieve us of these obligations. With respect to any of our product candidates that may enter clinical development, we and our CROs and other service providers, as well as our clinical trial sites, including principal investigators, are required, and we rely on them, to comply with good clinical practices (GCP) requirements, which are regulations and guidelines enforced by the FDA and comparable foreign regulatory authorities. Regulatory authorities enforce GCPs through periodic inspections of clinical trial sponsors and clinical trial sites, including principal investigators. If we or any of our CROs or other service providers, or any clinical trial sites or principal investigators involved in our trials, fail to comply with applicable GCPs, the clinical data generated from these clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We cannot be certain that upon inspection by a given regulatory authority, such regulatory authority will determine that any of our clinical trials comply with GCP. In addition, to the extent third parties executing or otherwise supporting our clinical trials, including CROs and clinical trial sites, including principal investigators, fail to conduct such clinical trials in accordance with GCP, fail to timely and successfully enroll patients in our clinical trials, or experience significant delays in the execution of our trials, including delays in achieving full enrollment or clinical trial data collection and analysis, we may experience program delays, incur additional costs, or both, which may harm our business. Our clinical trials must also be conducted using product produced in compliance with cGMP regulations, and our failure to do so may require us to repeat clinical trials, which would delay the regulatory approval process for the relevant product candidate.

Further, third parties that support our preclinical and clinical programs, such as service providers, including CROs, independent clinical investigators, and clinical trial sites, including principal investigators, are not our employees, and we are unable to control, other than by contract, the amount of resources, including time, that they devote to our product candidates, preclinical studies, and clinical trials. If such third parties, including our CROs or other service providers, are unable to attract, retain, and motivate qualified personnel, they may be unable to perform their obligations in a timely manner, or their performance may be substandard. If such third parties fail to devote sufficient resources to the development of our product candidates, or if their performance is substandard or does not meet our quality requirements, it may delay or compromise the prospects for approval and commercialization of any such product candidates. In addition, in order for these third parties to perform under their contracts with us, we regularly disclose or plan to disclose to these third parties confidential or proprietary information, which increases the risk that this information will be misappropriated. Additionally, disruptions caused by global geo-political, economic, and other factors beyond our control may increase the likelihood that these third parties encounter difficulties or delays in performing their obligations to us, including with respect to initiating, enrolling, conducting, or completing our planned clinical trials.

There is a limited number of third parties, including service providers such as CROs and clinical trial sites, that specialize in or have the expertise required to achieve our business objectives. These third parties generally have the right to terminate their agreements with us in the event of our uncured material breach, and may have the right to terminate under other circumstances, including if it can be reasonably demonstrated that the safety of the subjects participating in our clinical trials warrants such termination. If any of our relationships with these third parties terminate, we may not be able to enter into arrangements with alternative third parties or do so in a timely manner or on commercially reasonable terms. If these third parties do not successfully carry out their contractual duties or obligations or meet expected deadlines, if they need to be replaced, or if the quality or accuracy of the data they obtain is compromised due to the failure to adhere to our preclinical or clinical protocols, regulatory requirements, or for other reasons, our preclinical studies or clinical trials may be extended, delayed, or terminated, the results thereof could be negatively impacted, and we may not be able to obtain regulatory approval for or successfully commercialize our product candidates. As a result, our results of operations and the commercial prospects for our product candidates would be harmed, our costs could increase, and our ability to generate revenues could be delayed. Switching from existing to alternative service providers or clinical trial sites, or adding new service providers or clinical trial sites, may involve significant cost and requires management time and focus. In addition, there is a natural transition period when a new service provider commences work, which could lead to delays and materially impact our ability to meet our desired development, including clinical development, timelines. Additionally, even if our service providers perform as required, they may lack the capacity to absorb higher workloads or take on additional capacity to support our needs. Though we carefully manage our relationships with these service providers, including our contracted laboratories and CROs, there can be no assurance that we will not encounter these types of challenges or delays in the future or that these delays or challenges will not have a material adverse impact on our business, financial condition, and prospects.

Risks Related to Intellectual Property and Information Technology

Our success depends on our ability to protect our intellectual property rights and proprietary technologies, and we may not be able to protect our intellectual property rights throughout the world.

Patent rights are national or regional rights. The filing, prosecution, maintenance, and defense of patent rights on our platform technologies and product candidates worldwide would be prohibitively expensive, and our intellectual property rights in some countries outside the United States may have a different scope and strength than do those in the United States. In addition, the laws of some foreign countries, particularly certain developing 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 intellectual property rights in all countries outside the United States or from making, using, selling, or importing products made using our intellectual property rights in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained intellectual property rights, including patent protection, to develop their own products and may also export otherwise infringing products to territories where we have intellectual property rights, including patent protection, but enforcement rights are not as strong as those in the United States. These products may compete with our products and our patent or other intellectual property rights may not be effective or adequate to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets, and other intellectual property, particularly those relating to biopharmaceutical products, which could make it difficult in those jurisdictions for us to stop the infringement or misappropriation of our patents or other intellectual property rights, or the marketing of competing products in violation of our proprietary rights. Proceedings to enforce our patent and other intellectual property rights in foreign jurisdictions are expensive, especially in jurisdictions where we have no local presence, and could result in substantial costs and divert our efforts and attention from other aspects of our business. Furthermore, such proceedings could put our patents at risk of being invalidated, held unenforceable, or interpreted narrowly, could put our patent applications at risk of not issuing, and could provoke third parties to assert claims of infringement or misappropriation 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. Similarly, if our trade secrets are disclosed in a foreign jurisdiction, competitors worldwide could have access to our proprietary information, and we may be without satisfactory recourse. Such disclosure could have a material adverse effect on our business. Moreover, our ability to protect and enforce our intellectual property rights may be adversely affected by unforeseen changes in foreign intellectual property laws. In addition, certain developing countries, including China and India, have compulsory licensing laws under which a patent owner may be compelled to grant licenses to third parties. In those countries, we and our licensors may have limited remedies if patents are infringed or if we or our licensors are compelled to grant a license to a third-party, which could materially diminish the value of those patents. In addition, many countries limit the enforceability of patents against government agencies or government contractors. 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.

Because of the expense and uncertainty of litigation, we may conclude that, even if a third party is infringing our issued patents, or any patents that may be issued as a result of our pending or future patent applications, or other intellectual property rights, the risk-adjusted cost of bringing and enforcing such a claim or action, which typically lasts for years before it is concluded, may be too high or not in the best interest of our company or our stockholders, or it may be otherwise impractical or undesirable to enforce our intellectual property against some third parties. Our competitors or other third parties may be able to sustain the costs of complex patent litigation or proceedings more effectively than we can because of their greater financial resources and/or more mature and developed intellectual property portfolios. In such cases, we may decide that the monetary cost of such litigation and the diversion of the attention of our management and scientific personnel could outweigh any benefit we may receive as a result of the proceedings and that the more prudent course of action is to simply monitor the situation or initiate or seek some other non-litigious action or solution. In addition, the uncertainties associated with litigation could compromise our ability to raise the funds necessary to initiate or continue our future clinical trials, continue our internal research programs, in-license needed technology or other product candidates, or enter into development partnerships that would help us bring our product candidates to market.

We depend on intellectual property licensed from third parties, and our rights to develop and commercialize our product candidates are subject to, in part, the terms and conditions of the applicable license agreements. If we breach our obligations under these agreements or if any of these agreements is terminated, we may be required to pay damages, lose our rights to such intellectual property and technology, or both, which would harm our business.

We depend on patents, know-how, and proprietary technology, both that we own and that we license from others, to research, develop, and commercialize our product candidates. We are a party to a number of intellectual property license agreements and acquisition agreements pursuant to which we have acquired certain of our core intellectual property rights. Moreover, we rely upon licenses to certain intellectual property rights and proprietary technology from third parties that are important or necessary for the development of our technologies and products, including technology related to our manufacturing processes and our product candidates. These licenses may not provide exclusive rights to use such intellectual property and technology in all relevant fields of use or in all territories in which we may wish to develop or commercialize our technology and products in the future. As a result, we may not be able to prevent competitors from developing and commercializing competitive products in such fields of use or territories. These licenses may also require us to grant back certain intellectual property rights to our licensors and to pay certain amounts relating to sublicensing patent and other rights.

We have entered into, and we expect to enter into in the future, license agreements and other agreements pursuant to which we may obtain access to or acquire intellectual property rights and technologies. These license and acquisition agreements impose, and we expect that future license and acquisition agreements will impose, various diligence, milestone and royalty payment, and other obligations on us. If we fail to comply with our obligations under these agreements, we may be required to pay damages, and the licensor may have the right to terminate the agreement. Any termination of these licenses could result in the loss of significant rights and could harm our ability to develop or advance one of our cell engineering platforms, or develop, manufacture, or commercialize one of our product candidates. See the subsection titled “Business— Key Intellectual Property Agreements” in Part I, Item 1 of this Annual Report for additional information regarding these key agreements.

Licensing of intellectual property is of critical importance to our business, involves complex legal, business, and scientific issues and is complicated by the rapid pace of scientific discovery in our industry. Disputes may arise between us and our licensors regarding intellectual property subject to a license agreement, including those relating to:

- the scope of rights granted under the license agreement and other issues related to interpretation of the agreement, certain provisions of which may be susceptible to multiple interpretations;
- 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;
- our right to sublicense the patent and other rights granted to us under the license agreement to third parties as part of collaborative development relationships;
- whether we are complying with our diligence obligations with respect to the use of the licensed intellectual property rights in relation to our development and commercialization of our product candidates, and what activities satisfy those diligence obligations;
- the priority of invention of patented technology;
- the amount and timing of payments owed under license agreements; and
- 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 our partners.

The resolution of any contract interpretation disagreement that may arise could change what we believe to be the scope of our rights to the relevant intellectual property or technology or increase what we believe to be our financial or other obligations under the relevant agreement, either of which could have a material adverse effect on our business, financial condition, results of operations, and prospects. Our business may also suffer if any current or future licensors fail to abide by the terms of the applicable agreement, if such licensors fail to enforce licensed patents against infringing third parties, if the licensed patents or other rights are found to be unpatentable, invalid, or unenforceable, or if we are unable to enter into or maintain necessary license agreements on acceptable terms or at all. If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current or future licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates. We are generally also subject to all of the same risks with respect to protection of intellectual property that we license as we are for intellectual property that we own, which are described below.

In addition, although we cannot currently determine the amount of the royalty obligations we would be required to pay on sales of future products, if any, the amounts may be significant. The amount of our future royalty obligations will depend on the technology and intellectual property we use in product candidates that we successfully develop and commercialize, if any. Therefore, even if we successfully develop and commercialize any product candidates, we may be unable to achieve or sustain profitability.

If we are unable to successfully maintain the intellectual property rights we currently have pursuant to agreements with third parties, or those we may in-license or acquire in the future, we may have to abandon development of the relevant research programs or product candidates, which could harm our ability to commercialize our products, and our business, financial condition, results of operations, and prospects could be materially adversely affected.

We depend, in part, on our licensors to file, prosecute, maintain, defend, and enforce certain patents and patent applications that are material to our business.

Certain patents relating to our product candidates are owned or controlled by certain of our licensors. Each of our licensors generally has rights to file, prosecute, maintain, and defend the patents we have licensed from such licensor in their name, generally with our right to comment on such filing, prosecution, maintenance, and defense, with some obligation for the licensor to consider or incorporate our comments, for our exclusively licensed patents. We generally have the first right to enforce our exclusively licensed patent rights against third parties, although our ability to settle such claims often requires the consent of the licensor. If our licensors, third parties from whom they license or have obtained the relevant patents, or any future licensees having rights to file, prosecute, maintain, and defend our patent rights fail, or have in the past failed, to properly and timely conduct these activities for patents or patent applications covering any of our product candidates, our ability to develop and commercialize those product candidates may be adversely affected and we may not be able to prevent competitors from making, using, or selling competing products. We cannot be certain that such activities have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents or other intellectual property rights. Pursuant to the terms of the license agreements with some of our licensors, these licensors may have the right to control enforcement of our licensed patents or defense of any claims asserting the invalidity of these patents and, even if we are permitted to pursue such enforcement or defense, we cannot ensure the cooperation of our licensors. We cannot be certain that our licensors will allocate sufficient resources or prioritize their or our enforcement of such patents or defense of such claims to protect our interests in the licensed patents. Even if we are not a party to these legal actions, an adverse outcome could harm our business because it could cause us to lose rights to intellectual property that we may need to operate our business or could cause us to lose the ability to exclude our competitors from using the intellectual property rights. In addition, even when we have the right to control patent prosecution of licensed patents and patent applications, enforcement of licensed patents, or defense of claims asserting the invalidity of those patents, we may still be adversely affected or prejudiced by actions or inactions of our licensors and their counsel that took place prior to or after our assuming control. In the event we breach any of our contractual obligations to our licensors related to such prosecution, we may incur significant liability to our licensors.

We may not be successful in obtaining or maintaining necessary rights to product candidates, product candidate components, or processes for our product development pipeline, which may require us to operate our business in a more costly or otherwise adverse manner than we anticipated. We may not be successful in obtaining or maintaining exclusive rights to owned and in-licensed patents or patent applications or future patents to the extent they are co-owned by us and third parties.

We own or license from third parties certain intellectual property rights necessary to develop our product candidates. The growth of our business will likely depend in part on our ability to acquire or in-license additional proprietary rights, including to advance our research or allow commercialization of our product candidates. If we are unable to successfully obtain rights to required third-party intellectual property or to maintain the existing intellectual property rights we have, we may have to abandon development or delay commercialization of one or more product candidates and our business and financial condition could suffer.

If we are unable to obtain or maintain necessary third-party intellectual property rights, we may be required to expend considerable time and resources to develop or license replacement technology. For example, our programs may rely upon technologies or product candidates that require the use of additional proprietary rights held by third parties. Furthermore, other pharmaceutical companies and academic institutions may have filed or may plan to file patent applications potentially relevant to our business. In order to work effectively and efficiently, or for other reasons, our product candidates may also require specific formulations, reagents, materials, components, or other technology, which may be covered by intellectual property rights held by others. In order to avoid infringing third-party patents, we may be required to license technology from these third parties to further develop or commercialize our product candidates. We may be unable to acquire or in-license third-party intellectual property rights that we identify as necessary or important to our business operations, including composition, method of use, method of making, or other intellectual property rights required to make, use, or sell our product candidates. Such licenses or other rights may not be available at a reasonable cost or on reasonable terms, or at all, and, as a result, we may be unable to develop or commercialize the affected product candidates, which would harm our business. We may need to cease use of the compositions or methods covered by such third-party intellectual property rights. In addition, we may need to seek to develop alternative approaches that do not infringe on such intellectual property rights, which, if we were successful in developing such alternatives, may entail additional costs and lead to delays in development. In certain cases, it may not be feasible for us to develop such alternatives, which would harm out ability to continue development of the affected product candidates. Even if we are able to obtain a license to such intellectual property rights, any such license may be non-exclusive, which may allow our competitors to access to the same technologies licensed to us.

Additionally, we sometimes collaborate with academic institutions to accelerate our preclinical research or development under written agreements with these institutions. Typically, these institutions provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the collaboration. However, we may be unable to negotiate a license within the specified timeframe or under terms that are acceptable to us. If we are unable to do so, the institution may license the intellectual property rights to other parties, potentially blocking our ability to pursue any of our programs to which such rights relate.

The licensing and acquisition of third-party intellectual property rights is competitive, and companies that may be more established, or have greater resources than we do, may also be pursuing strategies to license or acquire third-party intellectual property rights that we may consider necessary or attractive in order to commercialize our product candidates. More established companies may have a competitive advantage over us due to their larger size and cash resources or greater clinical development and commercialization capabilities. There can be no assurance that we will be able to successfully complete negotiations and ultimately license or acquire the intellectual property rights necessary or useful for the development of our product candidates. Any delays in entering into, or inability to enter into, license or other agreements pursuant to which we obtain rights related to our product candidates could delay or halt the development and commercialization of our product candidates in certain geographies, which could harm our business prospects, financial condition, and results of operations.

Moreover, some of our owned and in-licensed patents or patent applications or future patents are or may be co-owned with third parties. If we are unable to obtain an exclusive license to any such third-party co-owner's interest in such patents or patent applications, such co-owner may be able to license their rights to other third parties, including our competitors, and our competitors could market competing products and technologies. In addition, such co-owner may not provide the cooperation necessary to enforce such patents against third parties. Furthermore, our owned and in-licensed patents may be subject to a reservation of rights by one or more third parties. Any of the foregoing could have a material adverse effect on our competitive position, business, financial conditions, results of operations, and prospects.

We may depend on intellectual property licensed or sublicensed to us from, or for which development was funded or otherwise assisted by, government agencies, such as the National Institutes of Health, for development of our technology and product candidates.

Government agencies have provided, and may in the future provide, funding, facilities, personnel, or other assistance in connection with the development of the intellectual property rights owned by or licensed to us. Such government agencies may have retained rights in such intellectual property, including the right to grant or require us to grant mandatory licenses or sublicenses to such intellectual property to third parties under specified circumstances, including if it is necessary to meet health and safety needs that we are not reasonably satisfying or if it is necessary to meet requirements for public use specified by federal regulations, or to manufacture products in the United States. Any exercise of such rights, including with respect to any such required sublicense, could result in the loss of significant rights and could harm our ability to commercialize or continue commercializing products that are subject to government rights. For example, at least one of our in-licensed patent cases related to each of our *ex vivo* and *in vivo* cell engineering platforms has been funded at least in part by the United States government. As a result, these patent cases are subject to certain federal regulations pursuant to the Bayh-Dole Act of 1980 (Bayh-Dole Act). In particular, the federal government retains a "nonexclusive, nontransferable, irrevocable, paid-up license" for its own benefit to inventions produced with its financial assistance. The Bayh-Dole Act also provides federal agencies with "march-in rights," which allow the government, in specified circumstances, to require the contractors or successors in title to the patent to grant a "nonexclusive, partially exclusive, or exclusive license" to a "responsible applicant or applicants." If the patent owner refuses to do so, the government may grant the license itself. Intellectual property rights discovered under government-funded programs are also subject to certain reporting requirements, compliance with which may require us or our licensors to expend substantial resources and failure to comply may lead to loss of rights. Such intellectual property is also subject to a preference for United States industry, which may limit our ability to contract with foreign product manufacturers for products covered by such intellectual property rights. Moreover, we cannot be sure that any intellectual property we may co-develop with academic institutions in connection with preclinical research or development activities will be free from government rights pursuant to the Bayh-Dole Act. If, in the future, we co-own or in-license technology that is critical to our business and is developed in whole or in part with federal funds subject to the Bayh-Dole Act, our ability to enforce or otherwise exploit patents covering such technology may be adversely affected.

If we are unable to obtain and maintain sufficient intellectual property protection for our platform technologies and product candidates, or if the scope of the intellectual property protection is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our products may be adversely affected.

Our success depends in large part on our ability to obtain and maintain patent protection in the United States and other countries with respect to our platform technologies and product candidates. We seek to protect our proprietary position by filing patent applications in the United States and abroad related to our novel discoveries and technologies that are important to our business. We have filed numerous patent applications and anticipate that we will file additional patent applications both in the United States and in other countries, as appropriate. However, we cannot predict:

- if and when any patents will issue from our owned and in-licensed patent applications, and whether the claims of any such issued patent will cover our product candidates and platforms or uses thereof in the United States or in other foreign countries;

- the degree and range of protection any issued patents will afford us against competitors, including whether third parties will find ways to invalidate or otherwise circumvent our patents;
- whether others will apply for or obtain patents claiming inventions similar to those covered by our patents and patent applications; or
- whether we will need to initiate litigation or administrative proceedings to defend our patent rights, which may be costly whether we win or lose.

Obtaining and enforcing patents is expensive and time-consuming, and we may not be able to file, and we and our licensors may not be able to prosecute, all necessary or desirable patent applications or maintain, defend, or enforce patents that may issue based on our patent applications at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development results before it is too late to obtain patent protection or before another party files a patent application covering the relevant inventions. Although we enter into confidentiality agreements with parties that have access to patentable aspects of our research and development output, such as our employees, corporate collaborators, outside scientific collaborators, contract research organizations, contract manufacturers, consultants, advisors, and other third parties, any of these parties may breach these agreements and disclose such results before a patent application is filed, thereby jeopardizing our ability to seek patent protection.

Composition of matter patents for biological products such as *ex vivo* and *in vivo* cell engineering product candidates often provide a strong form of intellectual property protection for those types of products, as such patents provide protection without regard to any method of use. We cannot be certain, however, that the claims in our pending patent applications covering the composition of matter of our product candidates will be considered patentable by the United States Patent and Trademark Office (USPTO) or by patent agencies in foreign countries, or that the claims in any of our issued patents will be considered valid and enforceable by courts in the United States or foreign countries. Method of use patents protect the use of a product for the specified method. This type of patent does not prevent a competitor from making and marketing a product that is identical to our product for an indication that is outside the scope of the patented method. Moreover, even if competitors do not actively promote their products for our targeted indications, physicians may prescribe these products “off-label” for those uses that are covered by our method of use patents. Although off-label prescriptions may infringe or contribute to the infringement of method of use patents, the practice is common and such infringement may be difficult to prevent or prosecute.

One aspect of the determination of patentability of inventions depends on the scope and content of the “prior art,” which is information that was or is deemed available to a person of skill in the relevant art prior to the priority date of the claimed invention. There may be prior art of which we are not aware that may affect the patentability of our inventions or, if issued, affect the validity or enforceability of a patent claim. Further, we may not be aware of all third-party intellectual property rights potentially relating to our product candidates or their intended uses, and as a result, the impact of such third-party intellectual property rights on the patentability of our own patents and patent applications, as well as upon our freedom to operate, is highly uncertain. Because patent applications in the United States and most other countries are typically confidential for a period of 18 months after filing, or may not be published at all, we cannot be certain that we were or will be the first to file any patent application related to our product candidates. As a result, the issuance, scope, validity, enforceability, and commercial value of our patent rights are highly uncertain. Furthermore, for United States patent applications in which all claims are entitled to a priority date before March 16, 2013, an interference proceeding can be instituted by a third party or the USPTO to determine who was the first to invent any of the subject matter covered by the relevant patent claims. For United States patent applications containing a claim not entitled to priority before March 16, 2013, there is a greater level of uncertainty in the patent law in view of the passage of the Leahy-Smith America Invents Act (the Leahy-Smith Act), which introduced significant changes to the United States patent laws, including new procedures for challenging pending patent applications and issued patents.

The strength of patents in the biotechnology and pharmaceutical fields can be uncertain and evaluating the scope and validity of such patents involves complex legal, factual, and scientific analyses, which may vary based on the jurisdiction in which the analyses are performed. Patents have in recent years been the subject of much litigation in the United States and worldwide, resulting in court decisions, including United States Supreme Court decisions, that have increased uncertainties as to the patentability of certain inventions as well as the enforceability of patent rights in the future. The patent applications that we own or in-license may fail to result in issued patents with claims that cover our platform technologies or our product candidates or uses thereof in the United States or in other foreign countries. Even if patents do successfully issue, third parties may challenge the patentability, validity, enforceability, or scope thereof, which may result in such patents being narrowed, invalidated, revoked, or held unenforceable. In the event of litigation or administrative proceedings involving our issued patents, we cannot be certain that the claims of any such patent will be considered patentable by administrative bodies or valid by courts in either the United States or foreign countries. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately cover our platform technologies or product candidates or prevent others from designing their products to avoid being covered by our patent claims. If the breadth or strength of protection provided by our patent filings is threatened, companies may be dissuaded from collaborating with us to develop, and could threaten our ability to successfully commercialize, our product candidates. In addition, the laws of foreign countries may not protect our rights to the same extent as the laws of the United States, or vice versa. Further, as patent rights are time limited, if we encounter delays in our clinical trials, the period of time during which we could market our product candidates under patent protection would be reduced.

We may not identify relevant third-party patents or may incorrectly interpret the relevance, scope, or expiration of a third-party patent, which might adversely affect our ability to develop and market our products.

We cannot guarantee that any of our patent searches or analyses, including the identification of relevant patents, the scope or validity of patent claims, or the expiration of relevant patents, are complete or thorough, nor can we be certain that we have identified each and every third-party patent and pending application worldwide, including in the United States, that is relevant to or necessary for the commercialization of our product candidates in any jurisdiction. The scope of a patent's claims is determined by an interpretation of the laws of the country in which the patent has been granted, the written disclosure in the patent, and the patent's prosecution history. Our interpretation of the relevance or the scope of a patent or a pending application may be incorrect, which may negatively impact our ability to market our products. We may incorrectly determine that our products are not covered by a third-party patent or may incorrectly predict whether a third party's pending application will issue with claims of relevant scope. Our determination of the expiration date of any patent worldwide, including in the United States, that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our product candidates. Our failure to identify and correctly interpret relevant patents may negatively impact our ability to develop and market our products.

Intellectual property rights do not necessarily protect us from all potential threats to our competitive advantage.

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

- we may not develop proprietary technologies that are patentable;
- we may choose not to file a patent in order to maintain certain rights as trade secrets or know-how, and a third party may subsequently file a patent covering such intellectual property;
- our pending patent applications may not lead to issued patents for various reasons;
- we or our licensors or future collaborators might not have been the first to make the inventions covered by, or the first to file, certain issued patents or pending patent applications that we own or have exclusively licensed, which may jeopardize our or our licensors' or future collaborators' ability to obtain an issued patent or the validity of any issued patents;
- the scope of protection of any patent that may issue from our own or our in-licensed patent applications is unpredictable and may not cover our product candidates or uses thereof in the United States or in other foreign countries;
- the claims of any patent that may issue based on our patent applications may not provide protection against competitors or any competitive advantages, or may be challenged by third parties;
- others may develop product candidates or technologies that are similar to ours but that are not covered by the claims of the patents that we own or have exclusively licensed;
- others may independently develop similar or alternative technologies or duplicate our technologies without infringing our intellectual property rights;

- our competitors may conduct research and development activities in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we may need to initiate litigation or administrative proceedings to enforce or defend our patent rights, which will be costly regardless of outcome;
- issued patents that we own or have exclusively licensed may be revoked or may be held invalid, unpatentable, unenforceable, or not infringed, including as a result of efforts to enforce our patents and legal challenges;
- we may fail to adequately protect and police our trade secrets and trademarks; and
- third-party patent rights may have an adverse effect on our business, including if these rights claim subject matter similar to or improving that covered by our patents and patent applications.

Should any of these events occur, they could significantly harm our business, results of operations, and prospects.

Confidentiality agreements with employees and third parties may not prevent disclosure of trade secrets and other proprietary information.

In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable or that we elect not to patent, subject matter for which patents are difficult to enforce, and other elements of our product candidates, technology, and product discovery and development processes that involve proprietary know-how, information, or technology that we do not cover through patent protection. Any disclosure, either intentional or unintentional, by our current or former employees, contractors, collaborators, or those of third parties, including those with whom we share our facilities and consultants and vendors that we engage to perform research, clinical trials, or manufacturing activities, or misappropriation by third parties (such as through a cybersecurity breach) of our trade secrets or proprietary or confidential information could enable competitors to duplicate or surpass our technological achievements, thus eroding our competitive position in our market. Because we rely and expect to continue to rely on third parties in the development and manufacture of our product candidates, we must, at times, share trade secrets with them, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Trade secrets and confidential information, however, can be difficult to protect. We seek to protect our trade secrets, know-how, and confidential information, including our proprietary processes, in part, by entering into confidentiality agreements with our employees, consultants, outside scientific advisors, contractors, collaborators, and other third parties. We require our employees to enter into written employment agreements containing provisions of confidentiality and obligations to assign to us any inventions generated in the course of their employment. In addition, we enter into agreements with our consultants, contractors, service providers, and outside scientific collaborators that typically include invention assignment obligations. We cannot guarantee that we have entered into such agreements with each party that may have or has had access to our trade secrets or proprietary or confidential information, including our technology and processes. Although we use reasonable efforts to protect our trade secrets and confidential information, our employees, consultants, outside scientific advisors, contractors, collaborators, and other third parties might intentionally or inadvertently disclose such information to competitors or other third parties, including, as to consultants and advisors, to their primary employers, in breach of our agreements with such parties, and adequate remedies for such breaches may be unavailable. In addition, competitors may otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Further, we may be required to disclose trade secrets and other confidential information to governmental authorities, including in connection with regulatory filings related to our product candidates, and such authorities may make certain documentation or information contained therein available to the public. If we are unable to or otherwise fail to take advantage of any opportunity to protect such trade secrets or other confidential information, our competitors could use such information to compete with us, which would significantly harm our business.

Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive, and time-consuming, and the outcome is unpredictable. 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 from using that technology or information to compete with us. Furthermore, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the United States and abroad. If we are unable to prevent unauthorized material disclosure of our intellectual property to third parties or misappropriation of our intellectual property by third parties, we will not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, operating results, and financial condition.

Third-party claims of intellectual property infringement against us or our collaborators may prevent or delay our product discovery, development, or commercialization efforts.

Our commercial success depends in part on our avoiding infringement of the patents and proprietary rights of third parties. We cannot be certain that our platform technologies, product candidates, and other proprietary technologies we may develop will not infringe existing or future patents owned by third parties. The legal and administrative landscape related to infringement of the patents and proprietary rights of third parties is fluid as 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. These include interference, derivation, *inter partes* review, post-grant review, and reexamination proceedings before the USPTO or oppositions and other comparable proceedings in foreign jurisdictions. Litigation and other legal proceedings relating to intellectual property claims, with or without merit, are unpredictable and generally expensive and time-consuming and, even if resolved in our favor, are likely to divert significant resources from our core business and distract our technical and management personnel from their normal responsibilities. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing, or distribution activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources and more mature and developed intellectual property portfolios. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to enter into or compete in the marketplace. Furthermore, patent reform and changes to patent laws add uncertainty to the possibility of challenge to our patents in the future.

Numerous issued patents and pending patent applications owned by third parties may exist worldwide in the fields in which we are developing our platform technologies and product candidates. We cannot provide any assurances that third-party patent filings that might be enforced against the making, use, or sale of our current product candidates or future products do not exist, which, if they did exist, would result in either an injunction prohibiting our sales, or an obligation to pay royalties on product sales or other forms of compensation to third parties. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates will be subject to claims of infringement of the patent rights of others. Third parties may assert that we infringe their patents or other intellectual property, or that we are otherwise employing their proprietary technology without authorization, and may sue us. There may be third-party patent filings of which we are currently unaware with claims, including claims to compositions, formulations, methods of manufacture, or methods of use or treatment, that cover our product candidates. It is also possible that patent filings owned by third parties of which we are aware, but which we do not believe are relevant to our platform technologies, product candidates, or other proprietary technologies we may develop, could be found to be infringed by our product candidates. Because patent applications can take many years to issue, there may be pending patent applications, including those of which we are unaware, that may later result in issued patents that our product candidates may infringe. In addition, third parties, including our competitors in both the United States and abroad, many of which have substantially greater resources and have made substantial investments in patent portfolios and competing technologies, may obtain patents in the future that may prevent, limit, or otherwise interfere with our ability to make, use, and sell our product candidates, and may claim that use of our technologies or the manufacture, use, or sale of our product candidates infringes upon these patents. If any such third-party patents were held by a court of competent jurisdiction to cover our technologies or product candidates, or if we are found to otherwise infringe a third party's intellectual property rights, the holders of any such patents may be able to block, including by court order, our ability to develop, manufacture, use, sell, or commercialize the applicable product candidate unless we obtain a license under the applicable patents or other intellectual property, or until such patents expire or are finally determined to be held unpatentable, invalid, or unenforceable. Such a license may not be available on commercially reasonable terms or may not be available at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. If we are unable to obtain a necessary license to a third-party patent on commercially reasonable terms, our ability to commercialize our product candidates may be impaired or delayed, which could significantly harm our business.

The pharmaceutical and biotechnology industries have produced a considerable number of patents, and it may not always be clear to industry participants, including us, which patents cover the making, use, or sale of various types of products or methods of use. The scope of patent coverage is subject to interpretation by both administrative bodies and the courts, and the interpretation is not always predictable or uniform. If we were sued for patent infringement, we would need to demonstrate that the making, use, or sale of our product candidates, products, or methods either do not infringe the patent claims of the relevant patent or that the patent claims are invalid or unenforceable, which we may not be able to do. Proving invalidity may be difficult. For example, in the United States, proving invalidity in court requires a showing of clear and convincing evidence to overcome the presumption of validity enjoyed by issued patents, and there is no assurance that a court would invalidate the claims of any such patent. Third parties asserting their patent or other intellectual property rights, such as confidential information or trade secrets, against us may also seek and obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize our product candidates or force us to cease some of our business operations. We may not have sufficient resources to bring any these actions to a successful conclusion. Defense against any of these claims, regardless of their merit and whether we are successful or not, would require us to incur substantial costs and could divert management and other employee resources from our business, cause development delays, and impact our reputation, which could have a material adverse effect on our business and operations. 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 to do on a cost-effective basis or require substantial time and monetary expenditure. In that event, we would be unable to further develop and commercialize our product candidates, which could harm our business significantly.

Our issued patents and patent applications could be found unpatentable, invalid, or unenforceable if challenged in courts or before an administrative body, and we may be involved in lawsuits to protect or enforce our patents or other intellectual property or the intellectual property of our licensors. Our participation in any such action could be expensive, time-consuming, and unsuccessful.

Our issued patents or pending patent applications may be challenged in the courts or patent offices in the United States and abroad. For example, our patent applications may be subject to a third-party pre-issuance submission of prior art to the USPTO, or we may become involved in post-grant review proceedings, opposition or derivation proceedings, reexaminations, or *inter partes* review proceedings, in the United States or elsewhere, challenging our patent rights or the patent rights of others. In addition, interference or derivation proceedings provoked by third parties or brought by the USPTO may be necessary to determine the priority of inventions or the correct inventorship of the inventions claimed in our patents or patent applications or those of our licensors. An unfavorable outcome could result in a loss of our current patent rights and could require us to cease using the related technology or to attempt to license rights from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms. An adverse determination in any such proceeding may result in loss of exclusivity or in our patent claims being narrowed, invalidated, held unpatentable, or held unenforceable, in whole or in part, which could limit our ability to exclude others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products, and otherwise no longer protect our product candidates.

In addition, competitors may infringe our issued patents or other intellectual property or the intellectual property of our licensors. To cease such infringement or unauthorized use, we may be required to file patent infringement claims, which can be expensive and time-consuming and could divert the time and attention of our management and personnel. If we or one of our licensors initiates legal proceedings against a third party to enforce a patent covering one of our platform technologies or product candidates, the defendant could counterclaim that we infringe their patents or that the patent covering our product candidate is invalid or unenforceable, or both. In patent litigation in the United States or abroad, defendant counterclaims alleging invalidity or unenforceability are commonplace, and there are numerous grounds upon which a third party can assert invalidity or unenforceability of a patent, including lack of novelty, obviousness, non-enablement, or insufficient written description, or that someone connected with prosecution of the patent withheld relevant information from the USPTO or made a misleading statement during prosecution. Third parties may also raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation, using post-grant proceedings such as re-examination, *inter partes* review, post-grant review, opposition, or derivation proceedings.

The outcome following legal assertions of unpatentability, invalidity, or unenforceability is unpredictable. In a proceeding before an administrative body, there is a risk that the body will decide that a patent is unpatentable or will be revoked, in whole or in part. In any patent infringement proceeding or declaratory judgment action, there is a risk that a court will decide that a patent of ours or our licensors is invalid or unenforceable, in whole or in part. In the event of either decision, we would no longer have the right to stop another party from using the invention covered by the relevant patent. There is also a risk that, even if the validity of such a patent is upheld, the court or administrative body 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. The court could also decide that the other party's use of our patented technology falls under the safe harbor to patent infringement under 35 U.S.C. §271(e)(1). With respect to the validity and patentability of our patents, for example, we cannot be certain that there is no invalidating prior art of which we, our patent counsel, and the patent offices were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection for the relevant product candidate, which could limit our ability to assert our patents against those parties or other competitors and prevent us from excluding third parties from making, using, or selling similar or competitive products.

Even if we establish infringement of our or our licensors' intellectual property, the remedies may be insufficient. For example, 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 in the course of litigation. In addition, there could 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, the price of our common stock could be substantially adversely affected. Litigation, interference, derivation, or other proceedings involving our or our licensors' patents may result in a decision adverse to our interests and, even if we are successful, may result in substantial costs and distract our management and other employees. Any failure to obtain or maintain patent protection with respect to our product candidates and other technologies, including as a result of such proceedings, could have a material adverse effect on our business, financial condition, results of operations, and prospects.

The terms of our patents may not be sufficient to effectively protect our products and business.

Patents have limited terms, and in many jurisdictions worldwide, including the United States, if all maintenance fees are timely paid, the natural expiration of a patent's term is generally 20 years after its first effective non-provisional filing date. Although various extensions may be available, the term of a patent, and the protection it affords, is limited. Given the significant 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. Further, if we encounter delays in our clinical trials, the period of time during which we could market our product candidates under patent protection would be reduced. Even if patents covering our product candidates are obtained, once the patent life has expired for a product, we may be open to competition from biosimilar or generic therapies. As a result, our patent portfolio may not provide us with sufficient rights to exclude others from commercializing product candidates similar or identical to ours. Our patents issued as of January 2024 have terms expected to expire on dates ranging from 2028 to 2042, subject to any patent term extensions that may be available. If patents are issued on our patent applications pending as of January 2024, the resulting patents are projected to expire on dates ranging from 2028 to 2044. In addition, although upon issuance in the United States a patent's term can be increased based on certain delays caused by the USPTO, this increase can be reduced or eliminated based on certain delays caused by the patent applicant during patent prosecution. A patent term extension based on regulatory delay may also be available in the United States and in certain other foreign jurisdictions. However, in the United States, only a single patent can be extended for each marketing approval, and any patent can be extended only once, for a single product. Moreover, the scope of protection during the period of the patent term extension in the United States does not extend to the full scope of the patent's claims, but instead only as to the scope of the product as approved. The laws governing analogous patent term extensions in foreign jurisdictions vary widely and many differ from the process in the United States. Additionally, we may not receive a patent term 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. If we are unable to obtain a patent term extension for any particular patent, or the term of any such extension is less than we request, the period during which we will have the right to exclude others from using the patent rights will be shortened. Our competitors may be able to obtain approval of competing products following our patent expiration and take advantage of our investment in development and clinical trials by referencing our clinical and preclinical data to launch a biosimilar product earlier than might otherwise be the case, which could reduce our revenue, possibly materially. In general, if we do not have sufficient patent term to protect our platform technologies and product candidates, our business and results of operations will be adversely affected.

Third parties may challenge the inventorship or ownership of or otherwise assert rights in our patent and other intellectual property rights.

We may be subject to claims that former employees, collaborators, or other third parties have an ownership interest in our patents or other intellectual property, including as a result of being an inventor or co-inventor. In the United States, the failure to name the proper inventors on a granted patent can result in the patent being unenforceable. Inventorship disputes may arise from conflicting views regarding the contributions made to an invention by the individuals named as inventors, the effects of foreign laws where foreign nationals are involved in the development of the subject matter of the patent, conflicting obligations of third parties involved in developing our product candidates, or as a result of questions regarding co-ownership of potential joint inventions. For example, inventorship disputes may arise from conflicting obligations of consultants or others who are involved in developing our platform technologies or product candidates or related intellectual property. Alternatively, or additionally, we may enter into agreements to clarify the scope of our rights in such intellectual property. Litigation may be necessary to defend against claims challenging or relating to inventorship and ownership of intellectual property rights. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or the right to use, valuable intellectual property. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and distract management and other employees.

We or our licensors may have relied on third-party consultants or collaborators or on funds from third parties, such as the United States government, such that we or our licensors are not the sole and exclusive owners of the patents that we own or that we have in-licensed. If third parties have ownership rights or other rights to our patents, including in-licensed patents, they may be able to license such patents to our competitors, and our competitors could make, use, or sell competing products and technology. This could have a material adverse effect on our competitive position, business, financial conditions, results of operations, and prospects.

In addition, although it is our policy to require our employees, contractors and other third parties who may be involved in the conception or development of intellectual property to execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who, in fact, conceives or develops intellectual property that we regard as our own. The assignment of intellectual property rights 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. As described elsewhere in these Risk Factors, such claims could be expensive and time-consuming to litigate or defend and could divert the time and attention of our management and other personnel, which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

We may be subject to claims that our employees, consultants, or independent contractors have wrongfully used or disclosed confidential information of third parties.

We have received confidential and proprietary information from third parties. In addition, we employ and engage individuals who were previously employed by or have otherwise provided services for other organizations, including at other biotechnology or pharmaceutical companies or at academic institutions. We may be subject to claims that we or our employees, consultants, or independent contractors have inadvertently or otherwise improperly used or disclosed confidential information of these third parties or organizations. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could cause us to incur substantial costs and distract our management and employees. If our defenses to these claims fail, in addition to requiring us to pay monetary damages, a court could prohibit us from using technologies or features that are essential to our product candidates, if such technologies or features are found to incorporate or be derived from the trade secrets or other proprietary information of these third parties or organizations. Moreover, any such litigation or the threat thereof may adversely affect our reputation and our ability to form strategic alliances or sublicense our rights to collaborators, engage with scientific advisors, or hire employees or consultants, each of which would have an adverse effect on our business, results of operations, and financial condition.

Our internal computer systems, or those used by third parties involved in our operations, such as research institution collaborators, CROs, CDMOs, and other service providers, contractors, or consultants, may fail or suffer security breaches or incidents.

We and third parties involved in our operations are increasingly dependent upon information technology systems, infrastructure, and data to operate our business. In the ordinary course of business, we currently and will continue to collect, store, and transmit confidential information (including trade secrets or other intellectual property, proprietary business information, including data from our research, preclinical studies, and clinical trials, and personal information). It is critical that we and these third parties do so in a secure manner to maintain the confidentiality, integrity, and availability of such information. For example, we have outsourced elements of our operations to third parties, and as a result we manage a number of third-party vendors that have access to our confidential information, including those that provide information technology and data security systems and services, and we do not have operational control over these third-party vendors. In addition, we currently and may in the future share or exchange confidential information with other third parties, such as collaborators, licensors, or strategic partners, none of which we have control over and all of which are subject to similar security risks as we are. As such, we are subject to risks not only from security incidents involving our own systems and networks, but also those of third parties with whom we work.

Despite the implementation of security measures (including edge technology designed to identify and protect our network from infiltration by third-party systems), our internal computer systems and those of any third parties involved in our operations, including our third-party research institution collaborators, CROs, CDMOs, and other service providers, contractors, and consultants, including vendors of information technology and data security systems and services, are vulnerable to damage and interruptions from cyberattacks, security breaches and incidents, computer viruses, ransomware, fraud, and other compromises and incidents involving or leading to unauthorized access to or loss, modification, unavailability, use, disclosure, or other processing of confidential information. In addition, certain systems or components thereof require enhanced or otherwise different security measures, which may require us to invest additional resources and may leave such systems more vulnerable to security compromises or incidents. These compromises and incidents may involve acts by current or former employees, service providers (including providers of information technology-specific services), nation states (including groups associated with or supported by foreign intelligence agencies), organized crime organizations, “hacktivists,” or others. For example, SolarWinds Corporation (SolarWinds), a provider of information technology monitoring and management products and services that we used, experienced a cyberattack in 2020 that was likely the result of a supply chain attack by an outside nation state. We took steps to mitigate the vulnerabilities identified within these products and, following our investigations, concluded that our confidential information was not materially accessed, lost, or stolen as a result of this cyberattack. However, there may be unknown effects from this or other cyberattacks that have occurred or may occur in the future, any of which could have a material negative impact on our business. In addition, in certain cases, we may rely on or incorporate third-party software, code, or other similar materials into our systems, processes, and operations, such as in the case of internal software development, which exposes us to various risks, including that such third-party materials may have harmful components that could enable access and harm to our systems and confidential information. If we are unable to or otherwise do not detect these harmful components, or are unable to manage their effects, our business could be significantly harmed.

In addition, the current geo-political climate and tensions between the United States and certain countries, including Russia and China, may increase our vulnerability to such cybersecurity attacks. For example, the conflict between Russia and Ukraine may create heightened threats of ransomware attacks and other cybersecurity threats for certain industries, including healthcare and pharmaceuticals. We continue to monitor and take steps to mitigate this risk, but we cannot ensure that such efforts will be sufficient to protect us from any such cyberattacks or other incidents. In addition, in July 2022, the heads of the FBI and MI5 issued joint warnings regarding the threat posed by China to national security due to the Chinese government’s increasing use of cyber espionage to steal technology from Western corporations and disrupt Western business. Moreover, the biotechnology industry is one of the top industries that China has targeted for domestic growth and development, and it therefore may be a primary target for such cyber espionage efforts. We continue to monitor our systems and upgrade our security capabilities in order to mitigate risk. However, any access to or loss or theft of our confidential information in connection with a future cyberattack could have a material adverse effect on our business.

Threats involving the misuse of access to our network, systems, and information by our current or former employees or third parties involved in our operations, including service providers, contractors, vendors, or partners, whether intentional or unintentional, also pose a risk to the security of our network, systems, and information, including data. For example, we are subject to the risk that employees may inadvertently share confidential information with unintended third parties, or that departing employees may take, or create their own information based on, our confidential information upon leaving the company. In addition, any such insiders may be the victims of social engineering attacks that enable unauthorized third parties to access our network, systems, and information using an authorized person’s credentials. We and our network, systems, and information are also vulnerable to malicious acts by insiders, including leaking, modifying, or deleting confidential information, or performing other acts that could materially interfere with our operations and business. Although we provide regular training to our employees regarding cybersecurity threats and best practices, we cannot ensure that such training or other efforts will prevent unauthorized access to or sabotage of our network, systems, and information.

Although we have not, to our knowledge, experienced any material system failure, accident, or security breach to date, because techniques used to obtain unauthorized access to or to sabotage systems are constantly evolving and generally are not recognized until they are launched against a target, we cannot be sure that our current practices, including our security and data protection efforts and investment in information security and technology will detect or prevent future significant breakdowns, data leakages, breaches in our systems or the systems of third parties involved in our operations, such as service providers, contractors, and collaborators, or other compromises or incidents that could have a material adverse effect upon our reputation, business, operations, or financial condition. If such an event were to occur, it could materially disrupt our operations and programs, the development of our product candidates could be delayed or otherwise negatively impacted, and our business could be significantly harmed. Any such event that leads to unauthorized access to or loss, modification, unavailability, use, disclosure, or other processing of personal information, including personal information regarding our clinical trial subjects or employees, or any reporting or belief that any such event or impact has occurred, could delay further development and commercialization of our product candidates, harm our reputation directly, require us to comply with federal or state breach notification laws and foreign law equivalents, subject us to mandatory corrective action, and otherwise subject us to liability under laws and regulations that protect the privacy and security of personal information. As a result, we could incur significant legal and financial exposure and reputational harm that could have a material adverse effect on our business. In any case, if we experience a cyberattack or security breach or incident, we could incur significant costs to remedy the resulting damage, including costs to deploy additional personnel and security and protection technologies, train employees, and engage third-party experts and consultants. We and the third parties involved in our operations may face difficulties and delays in identifying, responding to, and remediating security breaches and incidents, and we may find it necessary or appropriate to put in place additional measures designed to identify, protect against, and otherwise address cyberattacks and security breaches and incidents. Although we maintain cyber liability insurance, we cannot be certain that our coverage will be adequate for liabilities actually incurred or that insurance will continue to be available to us on commercially reasonable terms or at all.

Further, our personnel, and those of any third parties involved in our operations, including vendors, service providers, collaborators, contractors, and consultants, may develop and use artificial intelligence technologies in the course of performing work for us, including generative artificial intelligence technologies (GenAI) that have the ability to output new content and information based on user inputs. GenAI has the potential to benefit our business and operations, possibly significantly, including by potentially creating efficiencies and enabling powerful research and development that may otherwise not be possible, and we may be at a competitive disadvantage if we do not or are unable to use GenAI, or only use it for limited purposes. However, use of GenAI in connection with our confidential, proprietary, or otherwise sensitive information, including personal data, may result in leaks, disclosure, or otherwise unauthorized or unintended access to or use or other processing of such information, including incorporation of such information into the applicable GenAI system or use of such information to further refine and train the GenAI models. Any such access or use, or any improper or inappropriate use, of GenAI could, for example, reveal trade secrets or other confidential information that may enable third parties to replicate or improve upon our technologies and programs, advance their technologies or programs more rapidly than we do, or otherwise negatively impact the value of, or our ability to obtain or maintain, intellectual property rights. Access to and use and other processing of personal data may subject us to risks and potential liability and obligations under applicable data privacy laws, as described elsewhere in these Risk Factors. Further, we may use the output of GenAI in our technologies, programs, and other aspects of our business, and such output could incorporate third party intellectual property, or we may otherwise be unable to own, protect, further develop, or ultimately use such output, which could significantly harm our business to the extent such technologies, programs, or other aspects of our business rely upon such output. Such output may also be false, non-sensical, biased, or otherwise harmful to our operations and business if incorporated therein. Further, our ability to use GenAI or further develop or use its output may depend on access to specific third-party software and infrastructure, such as processing hardware or third-party artificial intelligence models, and we cannot control the availability or pricing of such software and infrastructure, especially in a highly competitive environment. We may also face novel and urgent cybersecurity risks and emerging ethical risks relating to the use of GenAI, which could adversely affect our operations, assets, including intellectual property and data, and reputation, as well as those of any third parties involved in our operations. Use of artificial intelligence technologies in general, and GenAI in particular, in our business could subject us to additional costs and expenses, litigation, regulatory actions and investigations, and other negative consequences. There is significant uncertainty with respect to the nature of the laws and regulations that have been and may in the future be adopted, including how such laws and regulations will be interpreted and applied, both within and outside of the U.S., with respect to the use of artificial intelligence technologies in general, and GenAI in particular, including the ownership of or right to use the output of GenAI. We may need to expend significant resources to modify and maintain our business practices to comply with such laws and regulations and to otherwise ensure appropriate and lawful use of artificial intelligence technologies, including GenAI and its output, in our technologies, programs, and other aspects of our business.

In addition, we have entered into and expect to continue to enter into collaboration, license, contract research, and manufacturing relationships with organizations that operate in certain countries that are at heightened risk of technology, data, and intellectual property theft through direct intrusion by private parties or foreign actors, including those affiliated with or controlled by state actors. If any theft or intrusion affects our technology, data, or intellectual property, the value of such technology, data, or intellectual property to our company may be diminished and our competitive position could be harmed. In such a case, our efforts to protect and enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from such intellectual property, and we may be at heightened risk of losing our proprietary intellectual property rights around the world, including outside of such countries, to the extent such theft or intrusion destroys the proprietary nature of our intellectual property.

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.

We currently and in the future will need to maintain and protect our trademarks and trade names to ensure, among other things, name recognition by potential partners and, if our products receive regulatory approval, customers in our markets of interest. We may not be able to protect our rights in our current or future trademarks and trade names or may be forced to stop using these trademarks or trade names, including as a result of such trademarks and trade names being challenged, infringed, circumvented, or declared generic or descriptive, or being determined to infringe on other marks. In any such case, we may no longer be able to enforce or use our rights in these trademarks and trade names. During trademark registration proceedings, our applications may be rejected by the USPTO or comparable foreign agencies. Although we would be given an opportunity to respond to those rejections, we may be unable to overcome such rejections. In addition, in the USPTO and in many comparable foreign agencies, third parties are given an opportunity to oppose pending trademark applications and to seek to cancel registered trademarks. Opposition or cancellation proceedings may be filed against our trademarks, and our trademarks may not survive such proceedings. If we are unable to establish name recognition based on our trademarks and trade names, we may not be able to compete effectively, and our business may be adversely affected. We may license our trademarks and trade names to collaborators or to third parties, such as distributors. Though these license agreements may provide guidelines for how our trademarks and trade names may be used, a breach of these guidelines or misuse of our trademarks and tradenames by our licensees may jeopardize our rights in or diminish the goodwill associated with our trademarks and trade names.

Moreover, any name we may propose to use as a trade name for any of our product candidates in the United States must be approved by the FDA, regardless of whether we have applied to register it as a trademark. Similar requirements exist in Europe. The FDA typically conducts a review of proposed product names, including an evaluation of potential for confusion with other product names. If the FDA or a comparable foreign regulatory authority objects to any of our proposed proprietary product names, we may be required to expend significant additional resources in an effort to identify a suitable substitute name that would be registerable under applicable trademark laws, not infringe the existing rights of third parties, and be acceptable to the FDA or comparable foreign regulatory authority. Furthermore, in many countries, owning and maintaining a trademark registration may not provide an adequate defense against a subsequent infringement claim asserted by the owner of a senior trademark. At times, competitors or other third parties may adopt trademarks or trade names similar to ours, thereby impeding our ability to build brand identity and possibly leading to market confusion. In addition, there could be potential trademark or trade name infringement claims brought against us by owners of other registered trademarks or trademarks that incorporate variations of our registered or unregistered trademarks or trade names. If we assert trademark infringement claims against third parties, 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.

Changes in United States and foreign patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

As is the case with other biopharmaceutical companies, our success is heavily dependent on intellectual property, and patent rights in particular. Obtaining and enforcing patents in the biopharmaceutical industry involves both technological and legal complexity and is therefore costly, time-consuming, and inherently uncertain. Changes in either the patent laws or interpretation of the patent laws in the United States could increase the uncertainties and costs associated with protection of, and may diminish our ability to protect, our inventions and our ability to obtain, maintain, and enforce our intellectual property rights and, more generally, could adversely affect the value of our intellectual property or narrow the scope of our owned and licensed patents. Patent reform legislation in the United States and other countries, including the Leahy-Smith Act signed into law on September 16, 2011, could increase uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents. The Leahy-Smith Act introduced a number of significant changes to United States patent law. These include provisions that affect the way patent applications are prosecuted, redefine prior art, and provide more efficient and cost-effective avenues for competitors to challenge patents. These include allowing third-party submission of prior art to the USPTO during patent prosecution and additional procedures to attack patents by USPTO-administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. In addition, under the Leahy-Smith Act, the United States transitioned to a first inventor to file system for filings made after March 2013, under which, assuming that the other statutory requirements are met, the first inventor to file a patent application will be entitled to the patent on an invention regardless of whether a third party was the first to invent the claimed invention. A third party that files a patent application in the USPTO after March 2013, but before we file an application covering the same invention, could therefore be awarded a patent covering an invention of ours even if we had made the invention before it was made by such third party. As a result, we must be cognizant of the time from invention to filing of a patent application. Since patent applications in the United States and most other countries are confidential for a period of time after filing or until issuance, we cannot be certain that we or our licensors were the first to either (i) file any patent application related to our platform technologies, product candidates, and other proprietary technologies we may develop or (ii) invent any of the inventions claimed in our or our licensors' patents or patent applications. Even where we have a valid and enforceable patent, we may not be able to exclude others from practicing the claimed invention if the other party can show that they used the invention in commerce before our filing date or the other party benefits from a compulsory license. The Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

In addition, in 2012, the EU Patent Package regulations were passed with the goal of providing a single pan-European Unitary Patent and a new European Unified Patent Court (UPC) for litigation involving European patents. The EU Patent Package was implemented on June 1, 2023. As a result, all European patents, including those issued prior to ratification of the European Patent Package, now by default automatically fall under the jurisdiction of the UPC. The UPC provides third parties, including our competitors, with a new forum to seek to centrally revoke our European patents and to seek to obtain pan-European injunctions. It will be several years before we will understand the scope of patent rights that will be recognized and the strength of patent remedies that will be provided by the UPC. Under the current EU Patent Package, we have the right to opt our patents out of the UPC for the first seven years of the UPC's existence, but doing so may preclude us from realizing the benefits of this new unified court.

Furthermore, the patent position of companies in the biopharmaceutical industry is particularly uncertain. Various courts, including the United States Supreme Court, have rendered decisions that could negatively affect the actual or perceived value of patents, such as recent federal district and appellate court rulings that have narrowed the scope of patent protection available in certain circumstances, weakened the rights of patent owners in certain situations, and in certain cases invalidated patents entirely. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents once obtained. Depending on decisions by Congress, the federal courts, the USPTO, and the relevant law-making bodies in other countries, 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 2013 case *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, the United States Supreme Court held that certain claims to naturally occurring substances are not patentable. Although we do not believe that any of the patents owned or licensed by us will be found invalid based on this decision, we cannot predict how future decisions by Congress, the federal courts, the USPTO, or the relevant law-making bodies in other countries may impact the value of our patents. Accordingly, evolving laws in the United States and other countries may adversely affect our and our licensors' ability to obtain new patents or to enforce existing patents and may facilitate third-party challenges to any of our owned or licensed patents.

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 noncompliance with these requirements.

The USPTO and foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment, and other similar requirements during the patent application process. Additionally, periodic maintenance fees on any issued patent must be paid to the USPTO and foreign patent agencies in several stages over the lifetime of the patent. We employ reputable law firms and other professionals to help us comply, and in many cases, 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. However, 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 a failure to perfect a priority claim, abandonment, or lapse of a patent or patent application include failure to respond to official actions within prescribed time limits, failure to pay fees, and failure to properly legalize and submit formal documents. In any such event, our competitors might be able to enter the market, which would have a material adverse effect on our business.

Risks Related to Our Regulatory Environment

The development and commercialization of biopharmaceutical products is subject to extensive regulation, and the regulatory approval processes of the FDA and comparable foreign regulatory authorities are lengthy, time-consuming, and inherently unpredictable. If we are unable to obtain regulatory approval for our product candidates on a timely basis, or at all, our business will be substantially harmed.

The clinical development, manufacturing, labeling, packaging, storage, recordkeeping, advertising, promotion, export, import, marketing, distribution, adverse event reporting, including the submission of safety and other post-marketing information and reports, and other activities we may engage in relating to our product candidates are subject to extensive regulation. In the United States, marketing approval of biologics requires the submission of a BLA to, and approval of such BLA by, the FDA, before a party can market any product candidate in the United States. A BLA must be supported by extensive clinical and preclinical data, as well as extensive information regarding pharmacology, chemistry, manufacturing, and controls. Outside the United States, many comparable foreign regulatory authorities employ similar approval processes. Any issues encountered by such regulatory authorities, including as a result of any prolonged government shutdown, could delay or otherwise negatively impact the development and commercialization of our product candidates. For example, closures of government agencies or staffing shortages or furloughs could increase the time required for interactions with regulatory authorities, including with respect to the review, acceptance, or approval of regulatory applications or other correspondence or submissions related to our product candidates, as well as our patent or other intellectual property applications, and could also result in delays in the interpretation and implementation of important laws and regulations relevant to our business.

To date, we have not submitted a BLA to the FDA or similar applications to comparable foreign regulatory authorities for any product candidate, and we cannot be certain that any of our product candidates will receive regulatory approval once a BLA or similar application has been submitted. The process of obtaining regulatory approval is expensive, uncertain, often takes many years following the commencement of clinical trials, and can vary substantially based upon the type, complexity, and novelty of the product candidates involved, as well as the target indications, patient population, and regulatory authority involved. As a company, we have no experience with the preparation and submission of a BLA or any other application for marketing approval. Further, the FDA has not yet granted approval for a therapeutic derived from stem cells, which we believe may increase the complexity, uncertainty, and length of the regulatory approval process for certain of our product candidates developed using our *ex vivo* cell engineering platform. In addition, the FDA has the authority to require a REMS plan as part of a BLA approval or after BLA approval, which may impose further requirements or restrictions on the distribution or use of an approved biologic, such as limiting prescribing to certain physicians or medical centers that have undergone specialized training, limiting treatment to patients who meet certain safe-use criteria, and requiring treated patients to enroll in a registry.

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

- the FDA or comparable foreign regulatory authorities may disagree with the design or implementation of our clinical trials;
- we may be unable to demonstrate to the satisfaction of the FDA or comparable foreign regulatory authorities that a product candidate satisfies the FDA's or such comparable foreign regulatory authorities' legal standards with respect to safety, purity, and potency, or efficacy, for its intended patient population;
- the results of clinical trials may not meet the level of statistical significance required by the FDA or comparable foreign regulatory authorities for approval;
- we may be unable to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;

- the FDA or comparable foreign regulatory authorities may disagree with our interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials may not be sufficient to support the submission of a BLA or other comparable foreign submission or to obtain regulatory approval in the United States or elsewhere, or regulatory authorities may not accept a submission due to, among other reasons, the content or formatting of the submission;
- the FDA or comparable foreign regulatory authorities may fail to approve our manufacturing processes or facilities or those of CDMOs with which we contract for clinical and commercial product supply; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may change in a manner that renders our clinical data insufficient for approval, including, for example, as a result of positive or negative data from third parties regarding other products or product candidates.

The lengthy approval process, as well as the unpredictability of clinical trial results, may prevent us from obtaining regulatory approval to market any of our product candidates, which would significantly harm our business, results of operations, and prospects. The FDA and comparable foreign regulatory authorities have substantial discretion in the approval process and in determining whether and when regulatory approval will be granted for any product candidates, including those that we may submit for approval in the future. For example, regulatory authorities in various jurisdictions have in the past had, and may in the future have, differing requirements for, interpretations of, and opinions on preclinical and clinical data, and certain regulatory authorities may more closely scrutinize our data, including our processes for maintaining the integrity of and disseminating such data, in particular, as our product candidates advance into later stages of development. We may be required to conduct additional preclinical studies, alter our proposed clinical trial designs, or conduct additional clinical trials to satisfy the regulatory authorities in each of the jurisdictions in which we hope to conduct clinical trials and develop and, if approved, market our products. In addition, from time to time, the FDA and comparable foreign regulatory authorities may adopt guidance in areas applicable to various aspects of our research and development programs, compliance with which could increase the time and expense required, or make it more difficult, to complete development activities and ultimately obtain regulatory approval for our product candidates.

In addition, even if we obtain approval for any of our product candidates, regulatory authorities may grant such approval for fewer or more limited indications than we request, may not approve the price we intend to charge for such product, may grant approval contingent on the performance of costly post-marketing clinical trials, or may approve such product with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that product. Notably, to date, the FDA has required that any patient receiving a gene therapy be followed for 15 years post-treatment. This post-treatment follow-up, and any other requirements that the FDA or other regulatory authorities may impose for gene or cell therapy products, increases the cost and complexity of developing and ultimately commercializing such products. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates.

Certain of our product candidates, including SC262, may require or otherwise benefit from use of a companion diagnostic to such product candidate for efficacy, safety, or other reasons. If we or our collaborators are unable to successfully develop and obtain regulatory approval for any necessary companion diagnostics for these product candidates, or experience significant delays in doing so, we may be unable to obtain regulatory approval for, commercialize, and generate revenue from such product candidates or be unable to realize their full commercial potential.

Certain of our product candidates, including SC262, may require or otherwise benefit from use of a companion diagnostic to such product candidate for efficacy, safety, or other reasons. In such cases, the FDA and comparable foreign regulatory authorities may require the development and regulatory approval or clearance of at least one companion diagnostic as a condition to approving such product candidate for use in the relevant patient population. We do not have experience in or capabilities for developing or commercializing companion diagnostics and expect that, if companion diagnostics are needed for our product candidates and satisfactory companion diagnostics are not commercially available, we will need to collaborate with third-party diagnostic development collaborators to perform these functions. The process of identifying suitable collaborators and developing and obtaining approval or clearance for companion diagnostics is lengthy, costly, uncertain, and time-consuming.

Companion diagnostics are subject to regulation by the FDA and comparable foreign regulatory authorities as medical devices and may require separate regulatory approval prior to commercialization. The approval or clearance of a companion diagnostic as part of a therapeutic product's further labeling limits the use of the therapeutic product to only those patients who express the specific characteristic that the companion diagnostic was developed to detect. For any companion diagnostic developed for use with one of our product candidates, we or our collaboration partners may experience delays in obtaining or may be unable to obtain regulatory approval or clearance for or be able to continue marketing of such companion diagnostic for various reasons, such as difficulties in manufacturing, technology transfer activities, or obtaining adequate third-party reimbursement, which could harm our business. If we or our collaboration partners are unable to obtain necessary regulatory approvals or clearance for companion diagnostics necessary for our product candidates or experience delays in doing so, we may suffer significant negative consequences, including:

- we may be unable to successfully complete clinical trials of the applicable product candidate;
- the applicable product candidate may not receive marketing approval on a timely basis or at all, if its safe and effective use depends on use of a companion diagnostic; or
- we may not realize the full commercial potential of the applicable product candidate.

The occurrence of any of these events could harm our business, possibly materially.

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

We may in the future seek accelerated approval for one or more of our product candidates. Under the FDA's Accelerated Approval Program, the FDA may grant accelerated approval to a product candidate designed to treat a serious or life-threatening condition that is reasonably likely to provide a meaningful therapeutic benefit over available therapies upon a determination that the product candidate has an effect on a surrogate endpoint or intermediate clinical endpoint that is reasonably likely to predict clinical benefit. The FDA considers a clinical benefit to be a positive therapeutic effect that is clinically meaningful in the context of a given disease, such as irreversible morbidity or mortality. For the purposes of accelerated approval, a surrogate endpoint is a marker, such as a laboratory measurement, radiographic image, physical sign, or other measure that is thought to predict clinical benefit, but is not itself a measure of clinical benefit. An intermediate clinical endpoint is a clinical endpoint that can be measured earlier than an effect on irreversible morbidity or mortality that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit.

The accelerated approval pathway may be used in cases in which the advantage of a new drug over available therapy may not be a direct therapeutic advantage, but is a clinically important improvement from a patient and public health perspective. If granted, accelerated approval is typically contingent on the sponsor's agreement to conduct, in a diligent manner, additional confirmatory studies or additional data analysis from prior studies to verify and describe the drug's clinical benefit. If such post-approval confirmatory studies or additional analyses fail to confirm the drug's clinical benefit or are not completed in a timely manner or at all, the FDA may withdraw its approval of the drug on an expedited basis.

In response to certain concerns regarding the current accelerated approval pathway, Congress has considered and may in the future consider legislation that could change aspects of the accelerated approval pathway, including in ways that may have uncertain outcomes. For example, in December 2022, President Biden signed an omnibus appropriations bill to fund the United States government through fiscal year 2023, included in which is the Food and Drug Omnibus Reform Act of 2022, which, among other things, introduced reforms intended to expand the FDA's ability to regulate products receiving accelerated approval, including by increasing the FDA's oversight over the conduct of confirmatory studies, such as requiring the FDA to specify conditions for post-approval study requirements and setting forth procedures for the FDA to withdraw a product on an expedited basis for non-compliance with post-approval requirements. To the extent the FDA requires us to amend the design of our clinical trials or requires additional trials to meet changes in the data requirements for approval, our clinical timelines and approval will be delayed, which could have an adverse effect on our business and operations. However, the ultimate impact of these reforms remains unclear. In addition, there is uncertainty regarding the extent to which reimbursement will be available for products that receive approval through this pathway. As a result, even if we obtain approval for a product candidate through this pathway, we may not receive reimbursement at the levels we expect, which could harm our ability to generate revenue and achieve or sustain profitability. The future of the Accelerated Approval Program is uncertain, and we cannot predict which, if any, additional changes Congress, the FDA, or other governmental authorities will make, when such changes will be adopted, or how existing or future changes will affect our business. These changes may alter the accelerated approval requirements in ways that make it more difficult or otherwise negatively impact our ability to obtain accelerated approval for our product candidates, and could increase the burden of compliance with post-marketing requirements, each of which could increase our costs and harm our ability to commercialize our products and achieve and sustain profitability.

Prior to seeking accelerated approval for any of our product candidates, we intend to seek feedback from the FDA and will otherwise evaluate our ability to seek and receive accelerated approval. There can be no assurance that, after our evaluation of the feedback and other factors, we will decide to pursue or submit a BLA for accelerated approval or any other form of expedited development, review, or approval, or that, if we decide to pursue any such pathway, our applications will be granted on a timely basis or at all. The FDA or other comparable foreign regulatory authorities could also require us to conduct further studies prior to considering our application or granting approval of any type. In addition, even if we are able to obtain accelerated approval or any other form of expedited approval for any of our product candidates, we may not obtain such approval in a timely manner or otherwise in accordance with our timelines, and the costs of obtaining such approval and performing any additional studies or analysis may be higher than we currently anticipate. Further, if the results of any such additional studies or analysis do not ultimately support full regulatory approval of the applicable product, it may be withdrawn from the market, which could harm our ability to generate revenue and otherwise negatively impact our business and financial prospects. A failure to obtain, or delay in obtaining, accelerated approval or any other form of expedited development, review, or approval for any of our product candidates would extend the period of time until commercialization, if any, of such product candidate, could increase the cost of development of such product candidate beyond what we anticipate, and could harm our competitive position in the marketplace.

Even if our product candidates receive regulatory approval, we and such products will be subject to ongoing obligations and continued regulatory review, which may require us to incur significant additional expense. Additionally, our product candidates, if approved, could be subject to labeling and other restrictions and market withdrawal, and we may be subject to penalties if we fail to comply with regulatory requirements or experience unanticipated problems with our products.

If the FDA or a comparable foreign regulatory authority approves any of our product candidates, the manufacturing processes, testing, labeling, packaging, distribution, import, export, adverse event reporting, storage, advertising, promotion, and recordkeeping for the product will be subject to extensive and ongoing legal and regulatory requirements. These requirements include submission of safety and other post-marketing information and reports, registration, as well as continued compliance with cGMP and GCP regulations for any clinical trials that we may conduct post-approval. Any regulatory approvals that we receive for our product candidates may also be subject to limitations on the approved indicated uses for which the product may be marketed or to the conditions of approval, or contain requirements for potentially costly post-marketing testing, including Phase 4 clinical trials, and surveillance to monitor the safety and efficacy of the approved product. Compliance with the requirements and limitations described in this paragraph, or any issues that arise in connection with such compliance, may require us to incur significant expense and limit our ability to timely and successfully commercialize our products.

Manufacturers and their facilities are required to comply with extensive FDA and comparable foreign regulatory authority requirements, including ensuring that quality control and manufacturing procedures conform to cGMP regulations, as well as, for the manufacture of certain of our product candidates, the FDA's cGTP regulations for the use of human cellular and tissue products to prevent the introduction, transmission, or spread of communicable diseases. As such, we and our CDMOs will be subject to continual review and inspections to assess compliance with cGMP and cGTP regulations and adherence to commitments made in any approved marketing application. Accordingly, we and third parties that we engage or with which we conduct business must continue to expend time, money, and effort in all areas of regulatory compliance, including manufacturing, quality control, and distribution.

In addition, if we obtain approval for any of our product candidates, our product labeling, advertising, and promotion will be subject to stringent legal and regulatory requirements and continuing regulatory review. In the United States, the FDA and the FTC strictly regulate the promotional claims that may be made about pharmaceutical products to ensure that any claims about such products are consistent with regulatory approvals, not misleading or false in any particular way, and adequately substantiated by clinical data. The promotion of a drug product in a manner that is false, misleading, unsubstantiated, or for unapproved (or off-label) uses may result in enforcement letters, inquiries and investigations, and civil and criminal sanctions by the FDA or the FTC. In particular, a product may not be promoted for uses that are not approved by the FDA, as reflected in the product's approved labeling. If we receive marketing approval for a product candidate, physicians may nevertheless prescribe it to their patients in a manner that is inconsistent with the approved label. If we are found to have promoted such off-label uses, we may be subject to significant liability. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant sanctions and false claims litigation under federal and state statutes, which can lead to consent decrees, civil monetary penalties, restitution, criminal fines and imprisonment, and exclusion from participation in Medicare, Medicaid, and other federal and state healthcare programs. The federal government has levied large civil and criminal fines against companies for alleged improper promotion and has enjoined several companies from engaging in off-label promotion. The FDA has also requested that companies enter into consent decrees or permanent injunctions under which specified promotional conduct is changed or curtailed.

If there are changes in the application of legislation or regulatory policies, or a regulatory authority subsequently discovers problems with a product, such as adverse events of unanticipated severity or frequency, or problems with the manufacturing of such product, including the facility where it is manufactured, or disagrees with the promotion, marketing, or labeling of a product, such regulatory authority may impose restrictions on that product or us, including requiring withdrawal of the product from the market. If we or one of our distributors, licensees, or co-marketers fail to comply with applicable legal or regulatory requirements, a regulatory authority may, among other things:

- issue warning or untitled letters;
- issue, or require us to issue, safety-related communications, such as safety alerts, field alerts, "Dear Doctor" letters to healthcare professionals, or import alerts;
- impose civil or criminal fines or penalties;
- suspend, limit, or withdraw regulatory approval, which could require us to conduct additional clinical trials, change our product labeling, or submit additional applications for regulatory approval;
- suspend any of our preclinical studies and clinical trials;
- refuse to approve our pending applications or supplements to approved applications;
- conduct inquiries investigations, which could require us to expend significant time and resources in response and generate negative publicity;
- impose restrictions on our operations, the product, or its manufacture, including requiring us to close our and our CDMOs' facilities; or
- impose regulatory sanctions, seize or detain products, refuse to permit the import or export of products, or require us to conduct a product recall or remove the product from the market.

If any of these events were to occur or if we otherwise fail to comply with ongoing legal and regulatory requirements, our ability to commercialize and generate revenue from our product candidates could be significantly impaired and we may incur substantial additional expense, which could materially adversely affect our business, financial condition, results of operations, and the overall value of our company. Moreover, the policies of the FDA and comparable foreign regulatory authorities may change and additional government regulations may be enacted that could prevent, limit, or delay regulatory approval of our product candidates. We cannot predict the likelihood, nature, or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may be subject to enforcement action and we may not achieve or sustain profitability.

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 may 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, including personnel with the expertise necessary to evaluate product candidates such as ours, and accept the payment of user fees, and other events that may otherwise affect the FDA's ability to perform routine functions. Average review times at the FDA have fluctuated in recent years. Moreover, these and other factors have increased the uncertainties associated with interpreting the FDA's guidance and predicting its areas of focus and responses to various issues. 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 extend the time necessary for new biologics or modifications to licensed biologics to be reviewed or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, the United States 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. If a prolonged government shutdown occurs, or if global health concerns, staffing shortages, budget restrictions, or other changes in government policies prevent the FDA or comparable foreign regulatory authorities from conducting their normal operations, such as regular inspections, reviews, or other regulatory activities, it could significantly impact the ability of the FDA or comparable foreign regulatory authorities to timely review and process our regulatory submissions, which could have a material adverse effect on our business.

Our business operations and current and future relationships with healthcare professionals, healthcare facilities and institutions, clinical investigators, consultants, vendors, customers, and third-party payors in the United States and elsewhere are subject to applicable anti-kickback, fraud and abuse, false claims, physician payment transparency, and other healthcare laws and regulations, which could expose us to substantial penalties, contractual damages, reputational harm, administrative burdens, and diminished profits.

Healthcare providers, healthcare facilities and institutions, physicians, and third-party payors in the United States and elsewhere will play a primary role in the recommendation and prescription of any product candidates for which we may obtain marketing approval. Our current and future arrangements with healthcare professionals, healthcare facilities and institutions, clinical investigators, consultants, customers, and third-party payors may expose us to broadly applicable fraud and abuse and other healthcare laws, including the federal Anti-Kickback Statute and the federal False Claims Act, that may constrain the business or financial arrangements and relationships through which we research, sell, market, and distribute any product candidates for which we obtain marketing approval. In addition, we may be subject to physician payment transparency laws and regulation by the federal and state governments and by foreign jurisdictions in which we conduct our business. The applicable federal, state, and foreign healthcare laws that affect our ability to operate include, but are not limited to, the following:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons or entities from knowingly and willfully soliciting, offering, receiving, or providing any remuneration (including any kickback, bribe, or certain rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, lease, order, or recommendation of, any good, facility, item, or service, for which payment may be made, in whole or in part, under any United States federal healthcare program, such as Medicare and Medicaid. The term "remuneration" has been broadly interpreted to include anything of value, including stock options. The federal Anti-Kickback Statute has also been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers, and formulary managers on the other hand. There are a number of statutory exceptions and regulatory safe harbors protecting some common activities from prosecution, but the exceptions and safe harbors are drawn narrowly and require strict compliance in order to offer protection. Any arrangements with prescribers must be for *bona fide* services and compensated at fair market value. 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 United States federal civil and criminal false claims laws, including the civil False Claims Act, which can be enforced by private citizens on behalf of the United States federal government through civil whistleblower or *qui tam* actions, and the federal civil monetary penalties law which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, to the United States federal government, claims for payment or approval that are false or fraudulent, knowingly making, using, or causing to be made or used, a false record or statement material to a false or fraudulent claim, or from knowingly making a false statement to avoid, decrease, or conceal an obligation to pay money to the United States federal government. Pharmaceutical manufacturers can cause false claims to be presented to the United States federal government by, among other things, engaging in impermissible marketing practices, such as the off-label promotion of a product for an indication for which it has not received FDA approval. Further, pharmaceutical 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. In addition, the government may assert that a claim including items and services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act;

• the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA), which imposes criminal and civil liability for, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, or knowingly and willfully falsifying, concealing, or covering up a material fact or making any materially false statement, in connection with the delivery of, or payment for, healthcare benefits, items, or services. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the healthcare fraud statute implemented under HIPAA or specific intent to violate it in order to have committed a violation;

• the Federal Food, Drug, and Cosmetic Act, which prohibits, among other things, the adulteration or misbranding of drugs, biologics, and medical devices;

• the United States Public Health Service Act, which prohibits, among other things, the introduction into interstate commerce of a biological product unless a biologics license is in effect for that product;

• the United States Physician Payments Sunshine Act and its implementing regulations, which require, among other things, certain manufacturers of drugs, devices, biologics, and medical supplies that are reimbursable under Medicare, Medicaid, or the Children's Health Insurance Program, with specific exceptions, to report annually to the Centers for Medicare and Medicaid Services (CMS) information related to certain payments and other transfers of value to physicians, as defined by statute, certain non-physician practitioners (including physician assistants, nurse practitioners, clinical nurse specialists, certified nurse anesthetists, anesthesiologist assistants, and certified nurse-midwives), and teaching hospitals, as well as ownership and investment interests held by such physicians and their immediate family members;

• analogous United States state laws and regulations, including: state anti-kickback and false claims laws, which may apply to our business practices, including research, distribution, sales and marketing arrangements, and claims involving healthcare items or services reimbursed by any third-party payor, including private insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the United States federal government, or otherwise restrict payments that may be made to healthcare providers and other potential referral sources; state laws and regulations that require drug manufacturers to file reports relating to pricing and marketing information, which requires tracking gifts and other remuneration and items of value provided to healthcare professionals and entities; and state and local laws requiring the registration of pharmaceutical sales representatives; and

• similar healthcare laws and regulations in foreign jurisdictions, including reporting requirements detailing interactions with and payments to healthcare providers.

Ensuring that our internal operations and future business arrangements with third parties comply with applicable healthcare laws and regulations will involve substantial costs. We have entered into, and expect to enter into in the future, consulting and scientific and clinical advisory board arrangements with physicians and other healthcare providers, including some who could influence the use of our product candidates, if approved. Compensation under some of these arrangements may include the provision of stock or stock options in addition to or in lieu of cash consideration. Because of the complex and far-reaching nature of these laws, it is possible that governmental authorities could conclude that our payments to physicians may not be fair market value for *bona fide* services or that our business practices do not comply with current or future statutes, regulations, agency guidance, or case law involving applicable fraud and abuse or other healthcare laws and regulations. For example, these relationships and any related compensation could result in perceived or actual conflicts of interest, or the FDA's determination that the financial relationship affected the conduct or interpretation of one of our preclinical studies or clinical trials. In such a case, the integrity of the data generated from such preclinical study or clinical trial may be questioned and the utility of the preclinical study or clinical trial itself may be jeopardized, which could result in the delay or rejection by the FDA of any regulatory submissions related to our product candidates. Any such delay or rejection could prevent us from commercializing our product candidates.

If our operations are found to be in violation of any of the laws described above or any other governmental laws and regulations that may apply to us, we may be subject to significant penalties, including civil, criminal, and administrative penalties, damages, fines, exclusion from government-funded healthcare programs, such as Medicare and Medicaid, or similar programs in other countries or jurisdictions, integrity oversight and reporting obligations to resolve allegations of noncompliance, disgorgement, imprisonment, contractual damages, reputational harm, diminished profits, and the curtailment or restructuring of our operations. Further, defending against any governmental actions can be costly and time-consuming and may require significant personnel resources. Therefore, even if we are successful in defending against any such actions, our business may be impaired. In addition, if any of the physicians or other providers or entities with whom we expect to do business are found to violate applicable laws or regulations, they may be subject to criminal, civil, or administrative sanctions, including exclusions from government funded healthcare programs and imprisonment, which could affect our ability to operate our business.

Our employees, independent contractors, principal investigators, consultants, vendors, commercial partners, and other third parties that we engage or with which we collaborate may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements.

We are exposed to the risk of fraud and other misconduct committed by our personnel and third parties that we engage or with which we collaborate in the course of our operations, including our employees, independent contractors, principal investigators, consultants, vendors, and commercial partners. It is not always possible to identify and deter misconduct or business noncompliance by such parties. We cannot ensure that precautions we take to detect and prevent inappropriate conduct, including our compliance controls, policies, and procedures, will in every instance protect us or be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from unlawful acts committed by such parties in the jurisdictions in which we operate, including trade restrictions and sanctions and employment, foreign corrupt practices, environmental, competition, and patient privacy and other data privacy and protection laws and regulations. Misconduct by any such third parties could include failures to comply with FDA regulations, provide accurate information to the FDA, comply with manufacturing standards we may establish, report financial information or data accurately, comply with federal and state healthcare fraud and abuse laws and regulations, including prohibitions on pricing, discounting, labeling, marketing and promotion, sales commission, customer incentive programs, and other business arrangements, or disclose unauthorized activities to us. Such misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation.

If any actions are instituted against us as a result of such misconduct or noncompliance, and we are not successful in defending ourselves or asserting our rights, those actions could have a material adverse effect on our business, financial condition, results of operations, and prospects. For example, we may be subject to or experience significant civil, criminal, and administrative penalties, damages, monetary fines, individual imprisonment, disgorgement of profits, possible exclusion from participation in Medicare, Medicaid, and other federal healthcare programs, contractual damages, reputational harm, diminished profits and future earnings, additional reporting or oversight obligations if we become subject to a corporate integrity agreement or other agreement to resolve allegations of noncompliance with the law, and curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and pursue our strategy.

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

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

- an increase in the minimum level of Medicaid rebates payable by manufacturers of brand name drugs from 15.1% to 23.1% of the average manufacturer price;
- expansion of the manufacturer Medicaid rebate obligation to drugs paid by Medicaid managed care organizations;
- a requirement for manufacturers to participate in a coverage gap discount program, under which they must 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 manufacturer’s outpatient drugs to be covered under Medicare Part D;
- a non-deductible annual fee on pharmaceutical manufacturers or importers who sell “branded prescription drugs” to specified federal government programs;

- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research;
- 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
- a licensure framework for follow-on biologic products.

Since its enactment, there have been judicial, executive, and Congressional challenges to certain aspects of the ACA. On June 17, 2021, the United States Supreme Court dismissed the most recent judicial challenge to the ACA without specifically ruling on the constitutionality of the ACA. Thus, the ACA will remain in force in its current form.

Other legislative changes have been proposed and adopted in the United Stated since the ACA was enacted, including aggregate reductions of Medicare payments to providers through 2032. In addition, on March 11, 2021, the American Rescue Plan Act of 2021 was signed into law, which eliminates the statutory Medicaid drug rebate cap, currently set at 100% of a drug's average manufacturer price, beginning January 1, 2024.

Most significantly, on August 16, 2022, President Biden signed the Inflation Reduction Act of 2022 (IRA) into law. This statute marks the most significant action by Congress with respect to the pharmaceutical industry since adoption of the ACA in 2010. Among other things, the IRA requires, beginning in 2026, manufacturers of certain drugs to engage in price negotiations with Medicare, with prices that can be negotiated subject to a cap; imposes rebates, first due in 2023, under Medicare Part B and Medicare Part D to penalize price increases that outpace inflation; and, beginning in 2025, replaces the Part D coverage gap discount program with a new discounting program. The IRA permits the Secretary of the Department of Health and Human Services (HHS) to implement many of these provisions through guidance, as opposed to regulation, for the initial years. HHS has issued and will continue to issue and update guidance as these programs are implemented. On August 29, 2023, HHS announced the list of the first ten drugs that will be subject to price negotiations, although the Medicare drug price negotiation program is currently subject to legal challenges. Various industry stakeholders, including certain pharmaceutical companies and the Pharmaceutical Research and Manufacturers of America, have initiated lawsuits against the federal government asserting that the price negotiation provisions of the IRA are unconstitutional. The impact of the IRA and these judicial challenges on the pharmaceutical industry and our business cannot yet be fully determined, but it is likely to be significant. If we obtain regulatory approval for any of our product candidates, the IRA could substantially and negatively impact the prices we may charge for such products, which could harm our ability to generate revenue and achieve and sustain profitability. In addition, in response to the Biden administration's October 2022 executive order, on February 14, 2023, HHS released a report outlining three new models for testing by the Center for Medicare and Medicaid Innovation, which will be evaluated on their ability to lower the cost of drugs, promote accessibility, and improve quality of care. It is unclear whether the models will be utilized in any health reform measures in the future.

Additionally, individual states in the United States have passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing and costs. Similar developments have occurred outside of the United States, including in the EU where healthcare budgetary constraints have resulted in restrictions on the pricing and reimbursement of medicines by relevant health service providers. To obtain reimbursement or pricing approval in some EU member states, we may be required to conduct studies that compare the cost-effectiveness of our product candidates to other therapies that are considered the local standard of care.

Further, there have been a number of, and there may in the future be, other policy, legislative, and regulatory proposals aimed at changing the pharmaceutical industry. The United States government, state legislatures, and foreign governmental entities have shown significant interest in implementing cost containment programs to limit the growth of government-paid healthcare costs, including price controls, restrictions on reimbursement and coverage, drug importation programs and proposals, and requirements for substitution of generic products for branded prescription drugs. Adoption of government controls and measures, and tightening of restrictive policies in jurisdictions with existing controls and measures, could exclude or limit our product candidates from coverage and limit payments for pharmaceuticals.

In addition, the policies of the FDA and of comparable foreign regulatory authorities may change and additional laws, regulations and government actions may be enacted that could prevent, limit, or delay regulatory approval of our product candidates. We cannot predict the likelihood, nature, or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. For example, if the Supreme Court reverses or curtails the *Chevron* doctrine, which gives deference to regulatory agencies in litigation against these agencies, including the FDA, more companies may bring lawsuits against the FDA to challenge its longstanding decisions and policies, which could undermine its authority, lead to uncertainties in the industry, and disrupt its normal operations, which could delay its review of any marketing applications we may submit for our product candidates. Moreover, currently enacted legislation may not be renewed once it expires, which may make it more difficult for us to obtain regulatory approval for and commercialize our product candidates. For example, the Prescription Drug User Fee Act (PDUFA) was enacted by Congress in 1992 to allow the FDA to collect fees from parties that produce certain human drug and biological products. Among other things, the fees collected under PDUFA provide for the timely review of regulatory submissions, such as BLAs. PDUFA has been renewed multiple times since its enactment, including at the end of September 2022, which will allow the FDA to continue collecting prescription drug user fees in future fiscal quarters. However, there is no guarantee that future renewals will occur in a timely manner, if at all. In addition, there may be amendments to PDUFA that could significantly affect how regulatory submissions are reviewed, and we cannot predict the extent of such amendments and how they will affect our business. If PDUFA is not renewed or its renewal is delayed, or if PDUFA is amended in certain ways, the FDA's ability to review any regulatory submissions and related correspondence for our product candidates may be materially adversely impacted, which could negatively impact our development timelines and ability to obtain regulatory approval of our product candidates.

In the EU, similar developments may affect our ability to profitably commercialize our product candidates, if approved. In addition to continuing pressure on prices and cost containment measures, legislative developments at the EU or member state level may result in significant additional requirements or obstacles that may increase our operating costs. The delivery of healthcare in the EU, including the establishment and operation of health services and the pricing and reimbursement of medicines, is almost exclusively a matter for national, rather than EU, law and policy. National governments and health service providers have different priorities and approaches to the delivery of health care and the pricing and reimbursement of products in that context. In general, however, the healthcare budgetary constraints in most EU member states have resulted in restrictions on the pricing and reimbursement of medicines by relevant health service providers. Coupled with ever-increasing EU and national regulatory burdens on those wishing to develop and market products, this could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to commercialize our product candidates, if approved. In markets outside of the United States and EU, reimbursement and healthcare payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies.

On December 13, 2021, Regulation 2021/2282 on Health Technology Assessment (HTA) amending Directive 2011/24/EU (the Regulation), was adopted in the EU. While the Regulation entered into force in January 2022, it will only begin to apply from January 2025 onwards, with preparatory and implementation-related steps to take place in the interim. Once the Regulation becomes applicable, it will have a phased implementation depending on the concerned products. The Regulation intends to boost cooperation among EU member states in assessing health technologies, including new medicinal products, and providing the basis for cooperation at the EU level for joint clinical assessments in these areas. The Regulation will permit EU member states to use common HTA tools, methodologies, and procedures across the EU, working together in four main areas, including joint clinical assessment of the innovative health technologies with the most potential impact for patients, joint scientific consultations whereby developers can seek advice from HTA authorities, identification of emerging health technologies to identify promising technologies early, and continuing voluntary cooperation in other areas. Individual EU member states will continue to be responsible for assessing non-clinical (e.g., economic, social, and ethical) aspects of health technology, and making decisions on pricing and reimbursement.

In the UK, the Voluntary Scheme for Branded Medicines Pricing and Access (VPAS) currently returns a portion of funds to the National Health Service (NHS) based on the sales of branded prescription medicines (innovative brands, branded generics, and biosimilars) when a maximum sales growth rate is exceeded. The 2019 VPAS caps the growth of NHS branded medicine spending at a nominal rate of 2% per year, with the industry returning any spending beyond the cap. However, the 2019 VPAS is due to come to an end in December 2023. It is possible that a future VPAS will include higher payback rates which could have a negative impact on our future potential NHS-based revenues.

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

Even if we are able to commercialize any product candidate, coverage and adequate reimbursement may not be available or such product candidate may become subject to unfavorable pricing regulations or third-party coverage and reimbursement policies, which would harm our business.

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

Our ability to commercialize any products successfully also will depend in part on the extent to which coverage and adequate reimbursement for these products and related treatments will be available from third-party payors, such as government authorities, private health insurers, and other organizations, which consider various factors in determining the level of coverage and reimbursement, including the nature of the disease to be treated, the availability and cost of other therapies for the same disease, and the size of the patient population that could benefit from such treatment. Even if we succeed in bringing one or more products to the market, these products may not be considered cost-effective, and the amount reimbursed for any products may be insufficient to allow us to sell our products on a competitive basis. For example, the cost of treatment with our product candidates may be expensive or more costly than other available treatment options, in particular, because such product candidates may require only a single or minimal number of administrations. Even if treatment costs are partially offset by coverage from third-party payors, required co-payments or deductibles may cause treatment with such product candidates to be too expensive for certain patients. Because our product candidates are in the early stages of development, we are currently unable to determine their cost effectiveness or the likely level or method of coverage and reimbursement. Increasingly, the third-party payors that reimburse patients or healthcare providers are requiring that drug companies provide these payors with predetermined discounts from list prices and are seeking to reduce the prices charged or the amounts reimbursed for drug products. If the price we are able to charge for any products we develop, or the coverage and reimbursement provided for such products, is inadequate in light of our development and other costs, our return on investment could be adversely affected.

There may be significant delays in obtaining reimbursement for newly-approved drug products, and coverage may be more limited than the purposes for which the drug product is approved by the FDA or comparable foreign regulatory authorities. Moreover, eligibility for reimbursement does not imply that any product for which we receive regulatory approval will be reimbursed in all cases or at a rate that covers our costs, including for research, development, manufacture, sale, and distribution.

Interim reimbursement levels for new drug products, if applicable, may also be insufficient to cover our costs and may not be made permanent. Reimbursement rates may be based on payments allowed for lower cost drug products that are already reimbursed, may be incorporated into existing payments for other services, and may reflect budgetary constraints or imperfections in Medicare data. Net prices for drug products may be reduced by mandatory discounts or rebates required by third-party payors and by any future relaxation of laws that presently restrict imports of drug products from countries where they may be sold at lower prices than in the United States. Obtaining coverage and adequate reimbursement for our product candidates may be particularly difficult because of the higher prices often associated with drugs administered under the supervision of a physician. Similarly, because our product candidates are physician-administered injectables, separate reimbursement for the product itself may or may not be available. Instead, the administering physician may or may not be reimbursed for providing the treatment or procedure in which our product is used.

Further, no uniform policy for coverage and reimbursement exists in the United States, and coverage and reimbursement can differ significantly from payor to payor. Third-party payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates, but also have their own methods and approval process apart from Medicare determinations. As a result, the coverage determination process is often time-consuming and costly and will likely require us to provide scientific and clinical support for the use of our product candidates to each payor separately, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance. Decisions regarding the extent of coverage and amount of reimbursement to be provided for any product candidates that we develop will be made on a payor-by-payor basis. One payor's determination to provide coverage for a drug does not assure that other payors will also provide coverage and adequate reimbursement for the drug. Additionally, a third-party payor's decision to provide coverage for a therapy does not imply that an adequate reimbursement rate will be approved.

As discussed elsewhere in these Risk Factors, there have been, and likely will continue to be, legislative and regulatory proposals at the foreign, federal, and state levels directed at broadening the availability of healthcare and containing or lowering the cost of healthcare. We cannot predict what initiatives may be adopted in the future. The continuing efforts of the government, insurance companies, managed care organizations, and other payors of healthcare services to contain or reduce costs of healthcare or impose price controls may adversely affect:

- the demand for any of our product candidates that may receive regulatory approval;
- our ability to set a price that we believe is fair for our approved products;
- our ability to obtain coverage and reimbursement approval for an approved product;
- our ability to generate revenue and achieve or maintain profitability;
- the level of taxes that we are required to pay; and
- the availability of capital.

Additionally, companion diagnostic tests that we or our collaborators may develop require coverage and reimbursement separate and apart from the coverage and reimbursement for their companion pharmaceutical or biologics products. Similar challenges to obtaining coverage and reimbursement, applicable to pharmaceutical or biologics products, will apply to companion diagnostic tests. Our inability to promptly obtain coverage and adequate reimbursement from third-party payors for the product candidates that we may develop and for which we obtain regulatory approval or any companion diagnostics that we or our collaborators may develop could have a material and adverse effect on our business, financial condition, results of operations, and prospects.

We face potential liability related to the privacy of personal information, including health information we utilize in the development of products developed from our ex vivo cell engineering platform, as well as information we may obtain from research institutions participating in our clinical trials and directly from individuals.

We and our partners and vendors are subject to various federal, state, and foreign data protection and privacy laws and regulations. If we fail, or are alleged to fail, to comply with these laws and regulations, we may be subject to litigation, regulatory investigations, enforcement notices, enforcement actions, fines, and criminal or civil penalties, as well as negative publicity, reputational harm, and potential loss of business.

In the United States, our and our partners' and vendors' operations are subject to numerous federal and state laws and regulations, including state data breach notification laws and federal and state data privacy laws and regulations that govern the collection, use, disclosure, and protection of health information and other personal information. For example, most healthcare providers, including research institutions from which we obtain patient health information, are subject to data privacy and security regulations promulgated under HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 (HITECH). Depending on the facts and circumstances, we could be subject to significant penalties if we violate HIPAA. For example, under HIPAA, we could potentially face substantial criminal or civil penalties if we knowingly receive protected health information from a HIPAA-covered healthcare provider or research institution that has not satisfied HIPAA's requirements for disclosure of such health information, or otherwise violate applicable HIPAA requirements related to the protection of such information. Even when HIPAA does not apply, failure to take reasonable steps to keep consumers' personal information secure may constitute a violation of the Federal Trade Commission Act.

Certain of the materials we use in our therapeutic research and development efforts, as well as stem cell lines used as starting material in our *ex vivo* cell engineering product candidates, are derived from human sources, which may contain sensitive identifiable personal information regarding the donor. In addition, we or our partners or vendors may maintain or otherwise have access to sensitive identifiable personal information, including health information, that we receive throughout the clinical trial process, in the course of our research collaborations, and directly from individuals (or their healthcare providers) who may enroll in our patient assistance programs, if any. We may become subject to further obligations under HIPAA as a result of our access to such information.

In addition, our collection of personal information generally, including information of our employees, human donors, or patients, may subject us to state data privacy laws governing the processing of personal information and requiring notification to affected individuals and state regulators in the event of a data breach involving such personal information. For example, we may be subject to state laws such as the California Consumer Privacy Act (CCPA) and its related regulations, and the California Privacy Rights Act (CPRA), which establish data privacy rights for California residents, with corresponding obligations on businesses related to transparency, deletion, and opt-out of the selling of personal information, and grant a private right of action for individuals in the event of certain security breaches that has increased the likelihood of, and risks associated with, data breach litigation. The CPRA, which became effective on January 1, 2023, significantly modified the CCPA, including by expanding consumers' rights with respect to certain sensitive personal information and imposing new audit requirements for higher risk data. The CPRA also created a new state agency that is vested with authority to implement and enforce the CCPA and the CPRA, which could result in increased privacy and information security enforcement. Additional compliance investment and potential business process changes may also be required. Numerous similar laws, and other laws governing privacy and information security, such as Washington's My Health, My Data Act, have been passed and continue to be proposed at the state and federal level, reflecting a trend toward more stringent privacy legislation in the United States. Certain state laws may be more stringent or broader in scope, or offer greater individual rights, with respect to confidential, sensitive, and personal information than federal, international, or other state laws, and such laws may differ from each other and have potentially conflicting requirements that would make compliance challenging, require us to expend significant resources to achieve compliance, and restrict our ability to process certain personal information.

Any clinical trial programs, including related regulatory filings, and research collaborations that we engage in outside the United States may implicate international laws and regulations concerning data protection and privacy, including those governing various aspects of clinical research and, in the EU, the General Data Protection Regulation (GDPR). The GDPR imposes obligations in relation to the collection, use, sharing, disclosure, transfer, and other processing of data relating to an identifiable living individual within the European Economic Area (EEA), or "personal data," including a principle of accountability and the obligation to demonstrate compliance through policies, procedures, training, and audit. The GDPR imposes stringent operational requirements for data controllers and data processors of personal data. Among other things, the GDPR requires that detailed notices be provided to clinical trial subjects and investigators, as well as maintenance of certain security levels for personal data and notification of data breaches or security incidents to appropriate data protection authorities or data subjects. Further, as a result of the UK's withdrawal from the EU effective as of December 31, 2020, we are required to comply with both the GDPR and the GDPR as incorporated into UK national law (UK GDPR) with respect to any clinical trial data generated from the EU and the UK, respectively, which may have differing requirements. We may be subject to diverging requirements under EU member state laws and UK law, such as whether consent can be used as the legal basis for processing of clinical trial data and the roles, responsibilities, and liabilities and respective data protection obligations as between CROs, clinical trial sites, and sponsors. As these laws develop and the rules diverge, we may need to make operational changes to adapt, which could increase our costs and adversely affect our business.

The GDPR and UK GDPR regulate cross-border transfers of personal data out of the EEA and the United Kingdom, respectively. Recent legal developments in Europe have created complexity and uncertainty regarding the legality of and requirements with respect to transfers of personal data from the EEA and United Kingdom to the United States and other countries in which we or our partners or service providers may operate. Case law from the Court of Justice of the European Union (CJEU) states that reliance on the standard contractual clauses, which are a standard form of contract approved by the European Commission as an adequate personal data transfer mechanism, alone may not necessarily be sufficient in all circumstances and that transfers must be assessed on a case-by-case basis. We currently rely and expect to rely in the future on the EU standard contractual clauses, the UK Addendum to the EU standard contractual clauses, and the UK International Data Transfer Agreement, as applicable, to transfer personal data outside of the EEA and the UK, including to the United States. Following a period of legal complexity and uncertainty regarding international personal data transfers, particularly to the United States, we expect that the regulatory guidance and enforcement landscape will continue to develop in relation to transfers to the United States and elsewhere. As a result, we may have to make certain operational changes and implement revised standard contractual clauses and other relevant documentation for existing data transfers within required time frames. If we are unable to transfer personal data between and among countries and regions in which we or our partners, collaborators, vendors, or clinical trial sites operate, it could adversely affect the manner in which we operate our business, affect the geographical location or segregation of our relevant systems and operations, and adversely affect our financial results.

These laws and regulations may also apply to service providers and vendors that store or otherwise process personal data on our behalf, such as CROs and other service providers that may support the conduct of our clinical trials and information technology or other vendors. If our data privacy or security measures fail to comply with applicable data privacy laws, or if a service provider or vendor misuses data we have provided to it or fails to safeguard such data, or otherwise fails to comply with such laws, we may be subject to litigation, regulatory investigations, enforcement notices, or enforcement actions imposing fines or requiring us to change the way we use personal data, as well as negative publicity, reputational harm, and potential loss of business. Failure to comply with the GDPR could result in penalties. Since we may be subject to the supervision of relevant data protection authorities under both the GDPR and the UK GDPR, we could be fined under each of those regimes independently in respect of the same breach. Penalties for certain breaches are up to the greater of €20 million (£17.5 million) or 4% of our global annual turnover. In addition to fines, GDPR noncompliance may result in regulatory investigations, reputational damage, orders to cease or change our data processing activities, enforcement notices, assessment notices for a compulsory audit, or civil claims, including class actions. As we continue to expand certain of our operations into other foreign countries and jurisdictions, we may be subject to additional laws and regulations that may affect how we conduct business.

We expect that we will need to expend significant capital and other resources to ensure ongoing compliance with applicable data privacy and security laws. Claims that we have violated individuals' privacy rights or breached our contractual obligations related to data privacy and security, even if we are not found liable, could be expensive and time-consuming to defend and could result in negative publicity that could harm our business. Moreover, even if we take all necessary action to comply with legal and regulatory requirements, we could be subject to a data breach or other unauthorized access of personal information, which could subject us to fines and penalties, as well as litigation and reputational damage.

If we fail to keep apprised of and comply with applicable international, federal, state, or local legal and regulatory requirements and changes thereto, we could be subject to a range of legal or regulatory actions that could affect our or any collaborators' ability to develop and seek to commercialize our product candidates. Any threatened or actual government enforcement action, or litigation when private rights of action are available, could also generate negative publicity, damage our reputation, result in liabilities, fines, and loss of business, and require that we devote substantial resources that could otherwise be used in support of other aspects of our business.

We and third parties involved in our operations are subject to United States and certain foreign laws and regulations relating to export and import controls, sanctions, embargoes, anti-corruption, and anti-money laundering. Compliance with these legal standards could impair our ability to compete in domestic and international markets. We could face criminal liability and other serious consequences for violations, which would harm our business.

We are subject to export control and import laws and regulations, including the United States Export Administration Regulations, United States Customs regulations, various economic and trade sanctions regulations administered by the United States Treasury Department's Office of Foreign Assets Controls, the United States Foreign Corrupt Practices Act of 1977, as amended (FCPA), the United States domestic bribery statute contained in 18 U.S.C. § 201, the United States Travel Act, the USA PATRIOT Act, and other state and national anti-bribery and anti-money laundering laws in the countries in which we conduct activities. International trade, tariff, and import/export laws and regulations may require us to obtain licenses or permits in order to complete certain activities necessary for the research, manufacture, and development of our product candidates. Moreover, we expect such laws and regulations, along with associated guidance and interpretations, to evolve over time in ways that may impact various aspects of our business. The process for obtaining any necessary licenses or permits may be lengthy and time-consuming, and if we are not able to obtain any such licenses or permits in a timely manner, we may experience delays in our ability to manufacture, develop, and commercialize our product candidates. Anti-corruption laws are interpreted broadly and prohibit companies and their employees, agents, contractors, collaborators, and other third parties from authorizing, promising, offering, or providing, directly or indirectly, improper payments or anything else of value to recipients in the public or private sector. We may engage third parties to sell products, if any, for which we receive regulatory approval outside the United States, to conduct clinical trials, or to obtain necessary permits, licenses, patent registrations, and other regulatory approvals. In the ordinary course of our business, we may have direct or indirect interactions with officials and employees of government agencies or government-affiliated hospitals, universities, and other organizations. We may be held liable for the corrupt or other illegal activities of our employees, agents, contractors, collaborators, and other third parties, even if we do not explicitly authorize or have actual knowledge of such activities. Any violations of the laws and regulations described above may result in substantial civil and criminal fines and penalties, imprisonment, the loss of export or import privileges, debarment, tax reassessments, breach of contract and fraud litigation, reputational harm, and other consequences.

In particular, there is currently significant uncertainty about the future relationship between the United States and various other countries, most significantly China, with respect to trade policies, treaties, tariffs, taxes, and other limitations on cross-border operations. The United States government has and continues to make significant additional changes in United States trade policy and may continue to take future actions that could negatively impact United States trade. For example, as discussed elsewhere in these Risk Factors, legislation has been introduced in Congress to limit certain interactions with certain Chinese biotechnology companies. We cannot predict what actions may ultimately be taken with respect to trade relations between the United States and China or other countries, what interactions, including products or services, may be subject to such actions, or what actions may be taken by the other countries in retaliation. If our interactions with parties affected by any such actions are limited or no longer possible, our business, liquidity, financial condition, or results of operations could be materially and adversely affected.

Third parties involved in our operations, including CDMOs and other service providers, partners, and collaborators, may also be also impacted by various laws and regulations, including those described above, compliance with or the effect of which could negatively impact the ability of these third parties to perform their obligations under our agreements with or otherwise harm our relationships with such third parties. For example, recently proposed legislation and acts by United States lawmakers have called for limitations on certain genetic information that may be shared with certain Chinese biotechnology firms and review of certain of these firms for sanctions due to potential threats to United States national security. To the extent that this or similar legislation becomes law or reviews or other actions are initiated, and any third parties involved in our operations are the subject of these laws or actions, then our relationships with these third parties, and our programs and business generally, could be materially negatively impacted.

Risks Related to Our Limited Operating History, Financial Condition, and Need for Additional Capital

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

We have a limited operating history. Biotechnology product development is a highly speculative undertaking and involves a substantial degree of risk. We have incurred significant losses since inception, have not generated any revenue from product sales, and have financed our operations historically through private placements of our convertible preferred stock and, more recently, through our initial public offering (IPO). We expect that it will be several years, if ever, before we have a commercialized product and generate revenue from product sales. We had net losses of $283.3 million, $269.5 million, and $355.9 million for the years ended December 31, 2023, 2022, and 2021, respectively. As of December 31, 2023, we had an accumulated deficit of $1.3 billion, which includes cumulative non-cash charges related to the revaluation of our success payment liabilities and contingent consideration of $10.3 million and $58.3 million, respectively. Our losses have resulted principally from expenses incurred for the research and development of our *ex vivo* and *in vivo* cell engineering platforms, management and administrative costs, and other expenses incurred while building our business infrastructure.

We expect our operating losses and expenses will decline in 2024, excluding one-time items, as a result of our strategic repositioning in October 2023, and likely increase over the longer term from the 2024 level if our clinical trials are successful, and if we expand our research and development efforts. Our operating losses and expenses are, and will in the future likely be, driven by our ongoing operations and our potential future expanded operations, including if and as we:

- expand our research and development efforts;
- advance and expand the capabilities of our *ex vivo* and *in vivo* cell engineering platforms;
- identify additional product candidates;
- advance preclinical development of our current product candidates and initiate additional preclinical studies, including with respect to future product candidates;
- commence and advance through clinical studies of our current and future product candidates;
- establish our manufacturing capabilities, including through CDMOs and building our internal manufacturing facilities;
- acquire and license technologies aligned with our *ex vivo* and *in vivo* cell engineering platforms;
- seek regulatory approval of our current and future product candidates;
- collaborate with third parties to support the development and regulatory approval of companion diagnostics to our product candidates;
- engage in commercialization activities, including product manufacturing, marketing, sales, and distribution for any of our product candidates for which we obtain marketing approval;

- expand our operational, financial, and management systems and increase personnel, including those required to support our preclinical and clinical development, manufacturing, and potential future commercialization efforts;
- continue to develop, prosecute, and defend our intellectual property portfolio; and
- continue to incur legal, accounting, and other expenses necessary to operate our business, including the costs associated with operating as a public company.

We have devoted a significant portion of our financial resources and efforts to building our organization, developing our *ex vivo* and *in vivo* cell engineering platforms, identifying and developing potential product candidates, executing preclinical studies, establishing manufacturing capabilities, preparing for and commencing clinical trials of our product candidates, acquiring technology, organizing and staffing the company, business planning, establishing and maintaining our intellectual property portfolio, raising capital, and providing general and administrative support for these operations. We are in the early stages of development of our product candidates and have not completed development or commercialization of any product candidate.

To become and remain profitable, we must succeed in identifying, developing, obtaining regulatory approval for, and eventually commercializing products that generate significant revenue. This will require us to be successful in a range of challenging activities, including completing preclinical studies and clinical trials of our product candidates, continuing to discover and develop additional product candidates, obtaining regulatory approval for any product candidates that successfully complete clinical trials, accessing manufacturing capacity, establishing marketing capabilities, and commercializing and ultimately selling any products for which we may obtain regulatory approval. We may never succeed in any or all of these activities and, even if we do, we may never generate revenue that is sufficient to achieve profitability. Even if we do achieve profitability, we may not be able to sustain profitability or meet outside expectations for our profitability. If any of the foregoing events were to occur, the value of our shares of common stock could be materially adversely affected.

Because of the numerous risks and uncertainties associated with biopharmaceutical product development, we are unable to accurately predict the timing or increases in the amount of expenses we will incur or when, or if, we will be able to achieve profitability. If we are required by the FDA or comparable foreign regulatory authorities to perform studies in addition to those we currently anticipate, or if there are any delays in commencing or completing our clinical trials or the development of any of our product candidates, our expenses could increase and our ability to obtain commercial revenue could be further delayed and become more uncertain, which will have a material adverse impact on our business.

We will require additional funding to finance our operations. If we are unable to raise capital when needed, or on acceptable terms, we could be forced to delay, reduce, or eliminate our product development programs or commercialization efforts.

Developing biopharmaceutical products, including conducting preclinical studies and clinical trials, is a very time-consuming, expensive, and uncertain process that takes years to complete. As described above, our operations have consumed substantial amounts of cash since inception, and we expect our expenses to increase if and as our ongoing activities grow in scope and breadth. Accordingly, we will need to obtain substantial additional funding in connection with our continuing operations. If we are unable to raise capital when needed or on attractive terms, we could be forced to delay, reduce, or eliminate our research and development programs or any future commercialization efforts, and our business, results of operations, and financial condition would be adversely affected.

As of December 31, 2023, we had $205.2 million in cash, cash equivalents, and marketable securities, which does not include approximately $179.9 million of net proceeds, after deducting underwriting discounts and commissions and estimated offering expenses, from our Follow-On Offering (as defined below) completed on February 12, 2024. Based on our current business plans, we believe that our existing cash, cash equivalents, and marketable securities as of December 31, 2023 will be sufficient to fund our operating expenses and capital expenditure requirements for at least the next 12 months. We have based this estimate on assumptions that may prove to be wrong, and we could use our capital resources more quickly than we currently expect, which could require us to seek additional funds sooner than planned, including through public or private equity or debt financings or other sources, such as strategic collaborations. Furthermore, we hold significant balances of cash and cash equivalents, including as necessary to conduct our day-to-day operations, some of which are held in deposit accounts at commercial banks in excess of the government-provided deposit insurance. In addition, we may seek additional capital due to favorable market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. For example, in August 2022, we entered into a sales agreement with Cowen and Company, LLC (Cowen), acting as sales agent, pursuant to which we may offer and sell through Cowen shares of our common stock having an aggregate offering price of up to $150.0 million from time to time in a series of one or more at the market equity offerings (collectively, the ATM facility). As of December 31, 2023, we had raised $27.6 million in net proceeds under the ATM facility. Further, on February 12, 2024, we completed an underwritten public offering pursuant to which we sold 21.8 million shares of our common stock, including 4.5 million shares pursuant to the full exercise of the underwriters' option to purchase additional shares, and pre-funded warrants to purchase 12.7 million shares of our common stock (the Follow-On Offering). Attempting to secure additional financing may divert our management from our day-to-day activities, which may adversely affect our ability to develop our product candidates.

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

- the scope, timing, progress, costs, and results of discovery, preclinical development, and clinical trials for our current or future product candidates, including the development of companion diagnostics to such product candidates;
- the number and scope of clinical trials required for regulatory approval of our current or future product candidates;
- the costs, timing, and outcome of regulatory review of our current or future product candidates and any companion diagnostics to such product candidates;
- the cost associated with building our manufacturing capabilities, as well as costs associated with the manufacturing of clinical and commercial supplies of our current or future product candidates;
- the costs and timing of future commercialization activities, including manufacturing, marketing, sales, and distribution, for any of our product candidates for which we receive marketing approval;
- the costs and timing of preparing, filing, and prosecuting patent applications, maintaining and enforcing our intellectual property rights, and defending any intellectual property-related claims, including any claims by third parties that we are infringing upon their intellectual property rights;
- our ability to maintain existing, and establish new, strategic collaborations, licensing, or other arrangements and the financial terms of any such agreements, including the timing and amount of any future milestone, royalty, or other payments due under any such agreement;
- the revenue, if any, received from commercial sales of our product candidates for which we receive marketing approval;
- the expenses required to attract, hire, and retain skilled personnel;
- the costs of operating as a public company;
- our ability to establish a commercially viable pricing structure and obtain approval for coverage and adequate reimbursement from third-party, including government, payors;
- potential interruptions or delays resulting from global geo-political, economic, and other factors beyond our control;
- the effect of competing technological and market developments; and
- the extent to which we acquire or invest in businesses, products, and technologies.

Our ability to raise additional funds will depend on financial, economic, geo-political, and market conditions and other factors over which we may have no or limited control. Market volatility, including as a result of bank failures, including Silicon Valley Bank (SVB) and Signature Bank (Signature) in 2023, and measures taken in response thereto, and the resulting impact on the broader banking sector, geo-political and economic instability resulting from the escalation in conflict between Russia and Ukraine, the conflict in the Middle East, tensions in US-China relations, and the aftermath of the COVID-19 pandemic, or other factors, could also adversely impact our ability to access capital as and when needed. Additional funds may not be available when we need them, on terms and at a cost that are acceptable to us, or at all. If adequate funds are not available to us on a timely basis, or on terms and at a cost that are acceptable to us, we could be required to:

- delay, limit, reduce, or terminate preclinical studies, clinical trials, or other research and development activities, or eliminate one or more of our development programs altogether, or otherwise restructure our operations or reduce our workforce; or

- delay, limit, reduce, or terminate our efforts to access manufacturing capacity or establish and operationalize our manufacturing facility, establish sales and marketing capabilities, or other activities that may be necessary to commercialize any product candidates for which we obtain regulatory approval, or reduce our flexibility in developing or maintaining our sales and marketing strategy with respect to any product candidates for which we obtain regulatory approval.

For example, as described elsewhere in these Risk Factors, we implemented the October 2023 strategic repositioning and associated workforce reduction in order to focus our resources on our *ex vivo* cell therapy product candidates, and correspondingly, reduce our near-term investment in our fusogen platform, which involves shifting our focus on fusogen to research activities. We will require additional funding and other resources in order to expand preclinical development and initiate clinical development for product candidates derived from our fusogen platform.

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 revenue, we expect to finance our operations with our existing cash, cash equivalents, and marketable securities, proceeds from any future equity or debt financings, and upfront, milestone, and royalty payments received under any future licenses, collaborations, or other arrangements. Additional capital may not be available on terms that are reasonable or acceptable to us, if at all. If we raise additional capital through the sale of equity or debt securities, existing stockholders' ownership interests will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our stockholders. In addition, any such issuance, or the possibility of such issuance, may cause the market price of our common stock to decline. Debt financing, if available, may result in increased fixed payment obligations and the existence of securities with rights that may be senior to those of our common stock, and involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures, declaring dividends, or acquiring, selling, or licensing intellectual property rights or assets, which could adversely impact our ability to conduct our business.

If we raise additional funds through collaborations, strategic alliances, or marketing, distribution, or licensing arrangements with third parties, we may have to relinquish valuable rights to our intellectual property, technologies, future revenue streams, or product candidates or grant licenses on terms that may not be favorable to us. We could also be required to seek funds through arrangements with collaborators or others at an earlier stage than otherwise would be desirable. Any of these occurrences may have a material adverse effect on our business, operating results, and prospects.

Our success payment and contingent consideration obligations in our license and acquisition agreements may result in dilution to our stockholders, drain our cash resources, or require us to incur debt to satisfy the payment obligations.

We agreed to make success payments, payable in cash, pursuant to our license agreement with Harvard and contingent consideration and success payments, payable in cash or stock, pursuant to our acquisition agreement with Cobalt. Pursuant to the terms of our license agreement with Harvard, we may be required to make up to an aggregate of $175.0 million in success payments to Harvard (Harvard Success Payments), payable in cash, based on increases in the per share fair market value of our common stock. The potential Harvard Success Payments are based on multiples of increasing value ranging from 5x to 40x based on a comparison of the per share fair market value of our common stock relative to the original issuance price of $4.00 per share at ongoing pre-determined valuation measurement dates. The Harvard Success Payments can be achieved over a maximum of 12 years from the effective date of the agreement. If a higher success payment tier is met at the same time a lower tier is met, both tiers will be owed. Any previous Harvard Success Payments made are credited against the Harvard Success Payment owed as of any valuation measurement date so that Harvard does not receive multiple success payments in connection with the same threshold. As of December 31, 2023, a Harvard Success Payment had not been triggered. See Note 4, License and collaboration agreements to our consolidated financial statements included elsewhere in this Annual Report for more details on the various per share common stock values that trigger a Harvard Success Payment.

In connection with the Cobalt acquisition, we are obligated to pay to certain former Cobalt stockholders contingent consideration (Cobalt Contingent Consideration) of up to an aggregate of $500.0 million upon our achievement of certain pre-defined development milestones and a success payment (Cobalt Success Payment) of $500.0 million, each of which is payable in cash or stock. The Cobalt Success Payment is payable if, at pre-determined valuation measurement dates, our market capitalization equals or exceeds $8.1 billion, and we are advancing a program based on the fusogen technology in a clinical trial pursuant to an IND, or have filed for, or received approval for, a BLA or new drug application for a product based on the fusogen technology. The Cobalt Success Payment can be achieved over a maximum of 20 years from the date of the acquisition, but this period could be shorter upon the occurrence of certain events. A valuation measurement date would be triggered upon a change of control if at least one of our programs based on the fusogen technology is the subject of an active research program at the time of such change of control. If there is a change of control and our market capitalization is below $8.1 billion as of the date of the change of control, the amount of the potential Cobalt Success Payment will decrease, and the amount of potential Cobalt Contingent Consideration will increase. As of December 31, 2023, a Cobalt Success Payment had not been triggered. See Note 3, Acquisitions, to our consolidated financial statements included elsewhere in this Annual Report for details on the amount of the potential Cobalt Success Payment and potential Cobalt Contingent Consideration if there is a change of control based on various thresholds for our market capitalization on such change of control date.

In order to satisfy our obligations to make these success payments, if and when they are triggered, we may issue equity or convertible debt securities that may cause dilution to our stockholders, or we may use our existing cash or incur debt to satisfy the success payment obligations in cash, which may adversely affect our financial position. In addition, these success payments may impede our ability to raise money in future public offerings of debt or equity securities or to obtain a third-party line of credit.

The contingent consideration and success payment obligations in our license and acquisition agreements may cause our operating results, net losses, and financial condition as reported by United States generally accepted accounting principles to fluctuate significantly from quarter to quarter and year to year, which may reduce the usefulness of our financial statements.

Our success payment and contingent consideration obligations under our license and acquisition agreements are recorded as liabilities on our balance sheets. Under United States generally accepted accounting principles (GAAP), we are required to estimate the fair value of these liabilities as of each quarter end, with changes in the estimated fair value recorded in research and development-related success payments and contingent consideration. Factors that may lead to increases or decreases in the estimated fair value of the success payment liabilities include, among others, changes in the value of our common stock and market capitalization, changes in volatility, the estimated number and timing of valuation measurement dates, the term of the success payments, and changes in the risk-free interest rate. Factors that may lead to increases or decreases in the estimated fair value of our contingent consideration obligations include, among others, the estimated likelihood and timing within which milestones may be achieved and the estimated discount rates. A small change in the inputs and related assumptions with respect to our success payment liabilities and contingent consideration may result in a relatively large change in the estimated valuation and associated liabilities and resulting expense or gain. As a result, our operating results, net losses, and financial condition as reported by GAAP may fluctuate significantly from quarter to quarter and year to year for reasons unrelated to our operations, which may reduce the usefulness of our GAAP financial statements. For example, as of December 31, 2023 and 2022, the estimated aggregate fair value of the Cobalt Success Payment and Harvard Success Payment liabilities was $12.8 million and $21.0 million, respectively, and the estimated fair value of the Cobalt Contingent Consideration was $109.6 million and $150.4 million, respectively.

For the three and twelve months ended December 31, 2023, we recorded an expense of $0.4 million and a gain of $8.2 million, respectively, related to the aggregate change in the estimated fair value of the Cobalt Success Payment and Harvard Success Payment liabilities. For the three and twelve months ended December 31, 2023, we recorded an expense of $6.4 million and a gain of $40.8 million, respectively, related to the change in the estimated fair value of the Cobalt Contingent Consideration. We have incurred net losses since our inception and expect to continue to incur net losses for the foreseeable future. It is possible that future fluctuations in the price of our common stock and market capitalization and the resulting change in the estimated fair value of our success payment liabilities could lead us to record net income in a future period despite us incurring operating losses and negative cash flows during such period. Alternatively, significant stock appreciation during a future period could lead to a significant increase in our recorded GAAP net loss.

Our limited operating history may make it difficult to evaluate our prospects and likelihood of success.

We have a limited operating history upon which to evaluate our business and prospects. Since our inception in July 2018, we have devoted substantially all of our resources and efforts to building our organization, developing our *ex vivo* and *in vivo* cell engineering platforms, identifying and developing potential product candidates, executing preclinical studies, establishing manufacturing capabilities, preparing for and conducting clinical trials of our product candidates, acquiring technology, organizing and staffing the company, business planning, establishing and maintaining our intellectual property portfolio, raising capital, and providing general and administrative support for these operations. We have not yet demonstrated our ability to successfully complete any clinical trials, including Phase 3 or other pivotal clinical trials, obtain regulatory 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 product commercialization. Additionally, we expect our financial condition and operating results to continue to fluctuate significantly from period to period due to a variety of factors, many of which are beyond our control. Consequently, predictions about our future success or viability are difficult to make and may not be as accurate as they could be if we had a longer operating history.

Risks Related to Commercialization of Our Product Candidates

We operate in highly competitive and rapidly changing industries, which may result in others discovering, developing, or commercializing competing products before or more successfully than we do.

The biotechnology and pharmaceutical industries are highly competitive and subject to significant and rapid technological change. Our success is highly dependent on our ability to discover, develop, and obtain marketing approval for new and innovative products on a cost-effective basis and to market them successfully. In doing so, we face and will continue to face intense competition from a variety of businesses, including large pharmaceutical companies, biotechnology companies, academic institutions, government agencies, and other public and private research organizations. These organizations may have significantly greater resources than we do and conduct similar research, seek patent protection, and establish collaborative arrangements for research, development, manufacturing, and marketing of products that compete with our product candidates. Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources, including intellectual property that may be necessary or useful for the development and commercialization of our product candidates, being concentrated in our competitors and becoming unavailable to us on commercially reasonable terms or at all. Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these industries.

With the proliferation of new drugs and therapies for our target indications, and as new technologies become available, we expect to face increasingly intense competition. If we fail to stay at the forefront of technological change, we may be unable to compete effectively. Any product candidates that we successfully develop and are able to commercialize, including those for the treatment of various cancers, B-cell-mediated autoimmune diseases, and type 1 diabetes, will compete with existing therapies and new therapies that may become available in the future. The highly competitive nature of and rapid technological changes in the biotechnology and pharmaceutical industries could render our product candidates or our technologies obsolete, less competitive, or uneconomical. Our competitors may, among other things:

- have significantly greater financial, manufacturing, marketing, drug development, technical, and human resources than we have;
- develop and commercialize products that are safer, more effective, less expensive, more convenient, or easier to administer, or have fewer or less severe side effects than any products for which we may obtain regulatory approval;
- obtain quicker regulatory approval;
- establish proprietary positions covering our products and technologies;
- implement more effective approaches to sales and marketing; or
- form more advantageous strategic alliances.

Our business, financial condition, and results of operations could be materially adversely affected by any of the foregoing events.

In addition, our potential future collaborators may decide to market and sell products that compete with the product candidates that we have agreed to license to them, which could have a material adverse effect on our future business, financial condition, and results of operations. Smaller and other early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. As described elsewhere in these Risk Factors and in the subsection titled “Business—Competition” in this Annual Report, we currently and in the future will compete with third parties in the development and commercialization of our product candidates.

Market opportunity and market growth for our product candidates may prove to be smaller than we initially estimated, and even if the markets in which we compete achieve the forecasted growth, our business may not grow at similar rates or at all, or we may otherwise be unable to capitalize on this opportunity.

We intend to initially focus our product candidate development on treatments for various diseases caused by missing or damaged cells. Our projections of addressable patient populations within any particular disease state that may benefit from treatment with our product candidates are based on our estimates. Market opportunity estimates and growth forecasts are subject to significant uncertainty and are based on assumptions and estimates. These estimates, which have been derived from a variety of sources, including scientific literature, surveys of clinics, patient foundations, and market research, may prove to be incorrect. Further, new studies may change the estimated incidence or prevalence of these diseases. Additionally, the potentially addressable patient population for our product candidates may not ultimately be amenable to treatment with our product candidates, including if the cost of treatment with our product candidates, including any required co-payments, is expensive or higher than other available therapies. Our market opportunity may also be limited by future competitor therapies that enter the market. If any of our estimates proves to be inaccurate, the market opportunity for any product candidate that we or our strategic partners develop could be significantly diminished, which would have an adverse material impact on our business.

In particular, certain of our product candidates are intended to treat cancer, and, in particular, B cell malignancies. Cancer therapies are sometimes characterized as first-line, second-line, or third-line and beyond, and the FDA often approves new therapies initially only for a particular line of use. When cancer is detected early enough, first-line therapy is sometimes adequate to cure the cancer or prolong life without a cure. Whenever first-line therapy, which usually consists of chemotherapy, antibody drugs, tumor-targeted small molecules, hormone therapy, radiation therapy, surgery, or a combination of these, proves unsuccessful, second-line therapy may be administered. Second-line therapies often consist of more chemotherapy, antibody drugs, tumor-targeted small molecules, radiation therapy, or a combination of these. Third-line therapies can include chemotherapy, antibody drugs, and small molecule tumor-targeted therapies, more invasive forms of surgery, and new technologies. The use of certain classes of therapies, including CAR T therapies, has been limited to a subset of patients with relapsed or refractory disease. Our projections of both the number of people who have the cancers we are targeting, as well as the subset of people with these cancers who are in a position to receive a particular line of therapy and who have the potential to benefit from treatment with our product candidates, are based on our beliefs and estimates. Consequently, even if our product candidates are approved for a later line of therapy, the number of patients that may be eligible for treatment with our product candidates may turn out to be much lower than expected.

In addition, even if the market opportunity for our product candidates achieves or exceeds the level and growth we anticipate, we may be unable to grow our business at the rate or in the manner necessary to successfully capitalize on this opportunity, including due to limited financial, personnel, and other resources. Our ability to successfully commercialize our product candidates will also be affected by numerous factors beyond our control, including limitations on third-party resources and infrastructure and other factors discussed in these Risk Factors.

We currently have no marketing, sales, or distribution infrastructure and we intend to either establish a sales and marketing infrastructure or outsource this function to a third party. Each of these commercialization strategies carries substantial risks to us.

We currently have no marketing, sales, or distribution capabilities because all of our product candidates are in the early stages of development. If one or more of our product candidates complete clinical development and receive regulatory approval, we intend to either establish a sales and marketing organization with technical expertise and supporting distribution capabilities to commercialize our product candidates in a legally compliant manner, or to outsource this function to a third party, both of which involve significant risks.

If we elect to establish our own sales and marketing capabilities, we will incur significant additional costs, including to hire and retain qualified personnel to build out the organization, and we may be unable to build out this organization in a way that will enable us to successfully market our products and generate revenues. If we elect to enter into arrangements with third parties to perform sales and marketing with respect to our product candidates, we may be unable to identify suitable partners, and even if we do identify such partners, we may be unable to negotiate the terms of such arrangement in a timely manner or at all, which could delay our marketing efforts and our ability to generate revenues. To the extent that we are able to enter into collaboration agreements with respect to marketing, sales, or distribution, our product revenue may be lower than if we directly marketed or sold any approved products. Such collaborative arrangements with partners may place the commercialization of our products outside of our control and would subject us to a number of risks, including that we may not be able to control the amount or timing of resources that our collaborative partner devotes to our products or that our collaborator's willingness or ability to complete its obligations, and our ability to complete our obligations under these arrangements, may be adversely affected by business combinations or significant changes in our collaborator's business strategy. If we are unable to enter into these arrangements on acceptable terms, or at all, we may not be able to successfully commercialize any products for which we receive regulatory approval.

If we are not successful in commercializing any approved products, either on our own or through collaborations with one or more third parties, our ability to generate product revenue will suffer and we may incur significant additional losses, which would have a material adverse effect on our business, financial condition, and results of operations.

Our product candidates for which we intend to seek approval as biologic products may face competition sooner than anticipated.

The ACA includes a subtitle called the Biologics Price Competition and Innovation Act of 2009 (BPCIA), which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product. Under the BPCIA, an application for a highly similar or "biosimilar" product may not be submitted to the FDA until four years following the date that the reference product was first approved by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first approved. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing the applicant's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate substantial evidence that such product provides benefits that outweigh its known and potential risks for the intended patient population, as well as data that demonstrate that such product can be manufactured to a pre-defined standard.

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

Jurisdictions outside the United States have also established abbreviated pathways for regulatory approval of biological products that are biosimilar to earlier approved reference products. For example, the EU has had an established regulatory pathway for biosimilars since 2004. However, biosimilars can only be authorized once the period of data exclusivity on the reference biological medicine has expired.

The increased likelihood of biosimilar competition has increased the risk of loss of innovators' market exclusivity. As a result of this and uncertainties regarding patent protection, we are not currently able to predict with certainty the length of market exclusivity for any particular product candidate that may receive marketing approval based solely on the expiration of the relevant patent(s) or the current forms of regulatory exclusivity. There may also be future changes in United States regulatory law that might reduce biological product regulatory exclusivity. The loss of market exclusivity for any product for which we receive regulatory approval could materially and negatively affect or prevent our ability to generate revenues, which could prevent us from achieving or sustaining profitability.

Risks Related to Ownership of Our Common Stock

Our principal stockholders and management own a significant percentage of our stock and will be able to exert significant control over matters subject to stockholder approval.

As of December 31, 2023, our executive officers, directors, holders of 5% or more of our capital stock, and their respective affiliates, beneficially owned, in the aggregate, approximately 62.5% of our common stock. Therefore, these stockholders have the ability to influence us through this ownership position. These stockholders may be able to determine all matters requiring stockholder approval. For example, these stockholders may be able to control elections of directors, amendments to our organizational documents, or approval of any merger, sale of assets, or other major corporate transaction. This may prevent or discourage unsolicited acquisition proposals or offers for our common stock that other stockholders may feel are in their best interests.

Future sales of our securities by us in the public market could cause our common stock price to fall.

At any time in the future we may sell a large number of shares of our common stock or rights to acquire a large number of shares of our common stock. Such sales, or the perception that such sales could occur, could cause our common stock price to decline as a result of, among other things, dilution from these sales, including pursuant to the exercise or conversion of rights to acquire our common stock, or discounts to the trading price of our common stock associated with such sales. In addition, transactions involving a large number of shares of our common stock, or the possibility that these transactions may occur, may also make it more difficult for us to sell equity securities in the future at a time and price that we deem appropriate

We expect that we will need significant additional capital in the future to support our planned operations, including conducting clinical trials, manufacturing, and other research and development activities, commercializing any product candidates for which we may obtain regulatory approval, and continuing to operate as a public company. To raise capital, we may sell shares of our common stock, warrants, convertible securities, or other securities in one or more transactions at prices and in a manner we determine from time to time. For example, as described elsewhere in these Risk Factors, we have sold shares of common stock in the ATM facility and shares of common stock and pre-funded warrants in the Follow-On Offering. If we sell additional securities in the future, whether in the ATM facility, in future public offerings, or otherwise, you could experience material dilution. In addition, such sales could result in new investors gaining rights, preferences, and privileges senior to the holders of our common stock.

In addition, in the future, we may issue additional shares of common stock, or other equity or debt securities convertible into common stock, in connection with a financing, acquisition, employee arrangement, or otherwise. Any such issuance could result in substantial dilution to our existing stockholders and could cause the price of our common stock to decline

Sales of a substantial number of shares of our common stock by our existing stockholders in the public market, or the perception that such sales could occur, could cause our stock price to fall.

If our existing stockholders sell, indicate an intention to sell, or there is a perception in the market that they intend to sell, a large number of shares of our common stock, the trading price of our common stock could decline. As of December 31, 2023, 197.9 million shares of our common stock were outstanding, which excludes the shares of common stock issued or issuable pursuant to pre-funded warrants sold in the Follow-On Offering as well as shares of common stock sold in the ATM facility and shares of common stock issued upon exercise of outstanding equity awards, in each case, after December 31, 2023, and 57.3% of such shares were beneficially owned by holders of 5% or more of our common stock. In addition, shares of common stock that are either subject to outstanding options or reserved for future issuance under our employee benefit plans will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules, applicable lock-up agreements, and Rule 144 and Rule 701 under the Securities Act of 1933, as amended (Securities Act). If these additional shares of common stock are sold, or there is a perception that they will be sold, in the public market, the trading price of our common stock could decline. Further, certain holders of shares of our common stock are entitled to rights with respect to the registration of their shares under the Securities Act. Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act, except for shares held by affiliates, as defined in Rule 144 under the Securities Act. Any sales of securities by these stockholders could have a material adverse effect on the trading price of our common stock.

We do not currently intend to pay dividends on our common stock and, consequently, our stockholders' ability to achieve a return on their investment will depend on appreciation of the value of our common stock.

We have never declared or paid cash dividends on our common stock. We currently intend to retain all available funds and any future earnings to support operations and to finance the growth and development of our business. We do not intend to declare or pay any cash dividends on our capital stock in the foreseeable future. As a result, any investment return on our common stock will depend upon increases in the value of our common stock, which is not certain.

Provisions in our amended and restated certificate of incorporation and our amended and restated bylaws and Delaware law might discourage, delay, or prevent a change in control of our company or changes in our management and, therefore, depress the market price of our common stock.

Our amended and restated certificate of incorporation and amended and restated bylaws contain provisions that could depress the market price of our common stock by acting to discourage, delay, or prevent a change in control of our company or changes in our management that the stockholders of our company may deem advantageous. These provisions, among other things:

- establish a staggered Board divided into three classes serving staggered three-year terms, such that not all members of the Board are elected at one time;
- authorize our Board to issue new series of preferred stock without stockholder approval and create, subject to applicable law, a series of preferred stock with preferential rights to dividends or our assets upon liquidation, or with superior voting rights to our existing common stock;
- eliminate the ability of our stockholders to call special meetings of stockholders;
- eliminate the ability of our stockholders to fill vacancies on our Board;
- establish advance notice requirements for nominations for election to our Board or for proposing matters that can be acted upon by stockholders at our annual stockholder meetings;
- permit our Board to establish the number of directors;

- provide that our Board is expressly authorized to make, alter, or repeal our bylaws;
- provide that stockholders can remove directors only for cause and only upon the approval of not less than 66 2/3% of all outstanding shares of our voting stock;
- require the approval of not less than 66 2/3% of all outstanding shares of our voting stock to amend our bylaws and specific provisions of our certificate of incorporation; and
- limit the jurisdictions in which certain stockholder litigation may be brought.

As a Delaware corporation, we are subject to the anti-takeover provisions of Section 203 of the Delaware General Corporation Law, which prohibits a Delaware corporation from engaging in a business combination specified in the statute with an interested stockholder (as defined in the statute) for a period of three years after the date of the transaction in which the person first becomes an interested stockholder, unless the business combination is approved in advance by a majority of the independent directors or by the holders of at least two-thirds of the outstanding disinterested shares. The application of Section 203 of the Delaware General Corporation Law could also have the effect of delaying or preventing a change of control of our company.

Our certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the exclusive forum 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, unless we consent in writing to the selection of an alternative forum, the sole and exclusive forum, to the fullest extent permitted by law, for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a breach of a fiduciary duty owed by any director, officer, or other employee to us or our stockholders, (iii) any action asserting a claim against us or any director, officer, or other employee arising pursuant to the Delaware General Corporation Law, (iv) any action to interpret, apply, enforce, or determine the validity of our second amended and restated certificate of incorporation or amended and restated bylaws, or (v) any other action asserting a claim that is governed by the internal affairs doctrine, shall be the Court of Chancery of the State of Delaware (or another state court or the federal court located within the State of Delaware if the Court of Chancery does not have or declines to accept jurisdiction), in all cases subject to the court's having jurisdiction over indispensable parties named as defendants. In addition, our amended and restated certificate of incorporation 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, but that the forum selection provision will not apply to claims brought to enforce a duty or liability created by the Securities Exchange Act of 1934, as amended (Exchange Act).

Although we believe these provisions benefit us by providing increased consistency in the application of Delaware law for the specified types of actions and proceedings, the provisions may have the effect of discouraging lawsuits against us or our directors and officers. Alternatively, if a court were to find the choice of forum provision contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our business, financial condition, and operating results. For example, under the Securities Act, federal courts have concurrent jurisdiction over all suits brought to enforce any duty or liability created by the Securities Act, and investors cannot waive compliance with the federal securities laws and the rules and regulations thereunder. Any person or entity purchasing or otherwise acquiring any interest in our shares of capital stock will be deemed to have notice of and consented to this exclusive forum provision, but will not be deemed to have waived our compliance with the federal securities laws and the rules and regulations thereunder.

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

Under the Tax Cuts and Jobs Act of 2017 (Tax Act), as modified by the Coronavirus Aid, Relief, and Economic Stability Act (CARES Act), our federal net operating losses (NOLs) generated in tax years beginning after December 31, 2017, may be carried forward indefinitely, but the deductibility of such federal NOLs is limited to 80% of taxable income. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended (the Code), if a corporation undergoes an "ownership change," generally defined as a greater than 50 percentage point change (by value) in its equity ownership by certain stockholders over a three-year period, the corporation's ability to use its pre-change NOL and other pre-change tax attributes, such as research and development tax credits, to offset its post-change income or taxes may be limited. We may have experienced ownership changes in the past and may experience ownership changes as a result of subsequent shifts in our stock ownership, some of which are outside our control. As a result, our ability to use our pre-change NOLs and tax credits to offset post-change taxable income, if any, could be subject to limitations. Similar provisions of state tax law may also apply. In addition, at the state level, there may be periods during which the use of NOLs is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. As a result, even if we attain profitability, we may be unable to use and gain the benefit of a material portion of our NOLs and tax credits.

Changes in U.S. and foreign tax laws could have a material adverse effect on our business, cash flow, results of operations, or financial conditions.

We are subject to tax laws, regulations, and policies of the United States federal, state, and local governments and of comparable taxing authorities in foreign jurisdictions. Changes in tax laws, and in the administration of such laws, could adversely affect our effective tax rate, our cashflow, our operating results, or our reported financial condition. For example, the Tax Act eliminated the option to deduct research and development expenditures currently and requires taxpayers to capitalize and amortize those expenditures over five or fifteen years pursuant to Code Section 174. If and when we come profitable, these changes may cause us to pay federal income taxes earlier under the revised tax law than under the prior law and may increase our total federal tax liability attributable to orphan drug programs and other research and development activities. There can be no assurance that our effective tax rate, tax obligations, tax credits, including the orphan drug designation credit, or incentives will not be adversely affected by these or other developments or changes in law.

General Risk Factors

Our quarterly operating results may fluctuate significantly or may fall below the expectations of investors or securities analysts, each of which may cause our stock price to fluctuate or decline.

We expect our operating results to be subject to quarterly fluctuations. Our net loss and other operating results will be affected by numerous factors, including:

- timing and variations in the level of expense related to the current or future development of our programs;
- timing and status of enrollment for our clinical trials;
- changes or fluctuations in our stock price and market capitalization, which could impact the value of our contingent obligations and cause fluctuations in our operating expenses as a result of these non-cash adjustments;
- impact of geo-political, economic, and other factors beyond our control on us or third parties with which we collaborate or that we engage;
- results of clinical trials, or the addition or termination of such clinical trials or funding support by us or potential future partners or other third parties;
- our execution of any collaboration, licensing, or similar arrangements, and the timing of payments we may make or receive under such arrangements or the termination or modification of any such arrangements;
- any intellectual property infringement, misappropriation, or violation lawsuit or opposition, interference, post-grant proceeding, or cancellation proceeding in which we may become involved;
- additions and departures of key personnel;
- strategic decisions by us or our competitors, such as acquisitions, divestitures, spin-offs, joint ventures, strategic investments, or changes in business strategy;
- the impact of global supply chain issues and inflation on the costs of laboratory consumables, supplies, and equipment required for our ongoing operations;
- if any product candidate we may develop receives regulatory approval, the timing and terms of such approval and market acceptance and demand for such product candidate;
- the timing and cost of establishing a sales, marketing, and distribution infrastructure to commercialize any products for which we may obtain marketing approval and intend to commercialize on our own or jointly with current or future collaborators;
- regulatory developments affecting current or future product candidates or those of our competitors;
- the amount of expense or gain associated with the change in value of the success payments and contingent consideration; and
- changes in general market and economic conditions.

If our quarterly operating results fall below the expectations of investors or securities analysts, the price of our common stock could decline substantially. Furthermore, any quarterly fluctuations in our operating results may, in turn, cause the price of our stock

to fluctuate substantially. We believe that quarterly comparisons of our financial results are not necessarily meaningful and should not be relied upon as an indication of our future performance.

Our stock price may be volatile or may decline regardless of our operating performance, which may result in substantial losses for investors and may potentially subject us to securities class action litigation, which is expensive and could divert management's attention.

The market price of our common stock, as well as investor perceptions of our business and its value, may be highly volatile and may fluctuate substantially as a result of a variety of factors, some of which are related in complex ways, and many of which are beyond our control, including the factors listed below and other factors describe in these Risk Factors:

- the commencement of, enrollment in, or results of current and future preclinical studies and clinical trials we may conduct, or changes in the development status of our product candidates;
- any delay in regulatory filings for our product candidates and any adverse development or perceived adverse development with respect to the applicable regulatory authority's review of such filings, including the issuance by the FDA of a "refusal to file" letter or a request for additional information;
- adverse results or delays in clinical trials;
- perceptions regarding the significance of data from our clinical trials, particularly preliminary data;
- our decision to initiate a preclinical study or clinical trial, not to initiate a preclinical study or clinical trial, or to terminate an existing preclinical study or clinical trial;
- adverse actions taken by regulatory agencies with respect to our preclinical studies or clinical trials, manufacturing supply chain, or sales and marketing activities, including failure to receive regulatory approval of our product candidates or companion diagnostics to such product candidates;
- changes in laws or regulations, including preclinical study or clinical trial requirements for regulatory approvals worldwide;
- adverse changes to our relationship with manufacturers or suppliers;
- manufacturing, supply, or distribution shortages;
- our failure to successfully commercialize our product candidates;
- changes in the structure of healthcare payment systems;
- additions or departures of key scientific or management personnel;
- unanticipated serious safety concerns related to the use of our product candidates;
- disputes or other developments relating to proprietary rights, including patent rights, trade secrets, litigation matters, and our ability to obtain patent protection for our technologies or product candidates;
- variations in our results of operations;
- our cash position;
- our failure to meet the estimates and projections of the investment community or that we may otherwise provide to the public;
- publication of research reports about us or our industry, or *ex vivo* and *in vivo* cell engineering products in particular, or positive or negative recommendations or withdrawal of research coverage by securities analysts;
- announcements made by us or our competitors about new product candidates and programs, success, setbacks, or other updates related to product candidates and programs that exist or are under development, strategic transactions and relationships, such as acquisitions collaborations, and joint ventures, or capital commitments;
- our inability to establish or successfully maintain any collaborations or other strategic relationships, if needed;
- our ability to effectively manage our growth;
- the size and growth of our initial target markets;
- changes in the market valuations of similar companies;

- press reports, whether or not true, about our business;
- sales or perceived potential sales of our common stock by us or our stockholders;
- overall fluctuations in the equity markets;
- ineffectiveness of our internal controls;
- changes in accounting practices or principles;
- changes or developments in the global legal and regulatory environment, including any new laws or regulations, or amendments to existing laws or regulations, that may impact the commercial environment for our product candidates;
- litigation involving us, our industry, or both, or investigations by regulators into our operations or those of our competitors;
- general political and economic conditions both within and outside the United States, including changes in interest rates, inflation, geo-political and economic instability resulting from the escalation in conflict between Russia and Ukraine, the conflict in the Middle East, tensions in US-China relations, and economic and tax policies announced by foreign countries; and
- other events or factors, many of which are beyond our control.

The stock market in general, and biopharmaceutical companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance. If the market price of our common stock does not exceed your purchase price, you may not realize any return on, and may lose some or all of, your investment. In addition, because the biotechnology industry is complex and subject to heightened risks as compared to many other industries, investors may be reluctant to place value in and invest in our company and choose instead to prioritize investment in other companies and industries, including those that may be perceived as more stable or that prioritize initiatives that may not be relevant to our industry or practical for us to prioritize at this stage in our development.

In the past, securities class action litigation has often been instituted against companies following periods of volatility in the market price of a company's securities. The market price of our common stock has fluctuated since our IPO and may continue in the future to be volatile. This type of litigation, if instituted, could result in substantial costs and a diversion of management's attention and resources, which would harm our business, operating results, or financial condition.

Market and economic conditions may negatively impact our business, financial condition, and share price.

Concerns about inflation, interest rates, energy costs, geo-political issues, the United States mortgage market and a declining real estate market, unstable global credit markets and financial conditions, and volatile oil prices have led to periods of significant economic instability, diminished liquidity and credit availability, declines in investment in industries perceived as complex or higher risk, such as biotechnology, declines in consumer confidence and discretionary spending, diminished expectations for the global economy and expectations of slower global economic growth going forward, increased unemployment rates, and increased credit defaults in recent years. Our general business strategy may be adversely affected by any such economic downturns, volatile business environments, and continued unstable or unpredictable economic and market conditions, including as a result of a prolonged government shutdown, or the perception or possibility that such a shutdown may occur. The closures of SVB and Signature in 2023 and their placement into receivership with the Federal Deposit Insurance Corporation created bank-specific and broader financial institution liquidity risk and concerns. Although government intervention ultimately provided depositors at SVB and Signature with access to their funds, adverse developments with respect to specific financial institutions or the broader financial services industry that have occurred or may occur in the future may lead to market-wide liquidity shortages, impair our ability to access near-term working capital needs, and create additional market and economic uncertainty. There can be no assurance that future credit and financial market instability and a deterioration in confidence in economic conditions will not occur, and we cannot predict the impact or follow-on effects of these insolvencies more broadly or on our business in particular. Further, there is no guarantee that the government will intervene to provide depositors with access to funds if similar events occur in the future. If other banks and financial institutions with which we have commercial relationships enter receivership or become insolvent in the future, our ability to access our existing cash, cash equivalents, and investments may be threatened, which could adversely affect our business and financial condition.

Given the depth and breadth of our portfolio, we assess and prioritize our programs on an ongoing basis based on various factors, including internal and external opportunities and constraints, which may result in our decision to advance certain programs ahead or instead of others. Given the volatility in our stock price and the increased difficulty in accessing global credit markets and raising capital due to the market and economic conditions described above, we have adjusted our pipeline prioritization strategy and

resource allocation in order to enable the success of our most advanced product candidates. In particular, we have gated investment in our programs, with future investment dependent on our achievement of certain milestones. Even if our programs achieve the required milestones, development and potential commercialization of our product candidates may be delayed, which could harm our competitive position. In order to manage resource constraints, we may be required to make decisions regarding how to prioritize our programs based on limited data. As a result, we may be required to delay or halt the development of potentially promising earlier stage programs to focus our resources on a limited number of more advanced programs with higher probabilities of success in the shorter term. Such decisions have, and in the future would, reduce the breadth and diversity of our portfolio and investments therein, potentially limit the long-term growth of our pipeline, and increase the risk and extent of the negative impact on our business if such programs are not successful.

In addition, if any of the events described occur, or if the market and economic conditions described above continue to deteriorate or do not improve, it may make any necessary debt or equity financing more difficult to complete, more costly, and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance, and stock price. As a result, we may be required to further adjust our pipeline prioritization strategy and resource allocation in order to extend our cash runway and enable the success of certain of our product candidates, which may require that we make adjustments based on limited information and slow or stop the development of certain product candidates. Additionally, rising rates of inflation in recent years have increased the costs associated with conducting our business, including by causing substantial increases in the costs of materials, including raw materials and consumables, equipment, services, and labor. Given that we do not currently generate revenue from sales of any of our product candidates, we do not have an ability to offset these increases in our costs. Moreover, given the unpredictable nature of the current economic climate, including future changes in rates of inflation, it may be increasingly difficult for us to predict and control our future expenses, which may harm our ability to conduct our business.

We or the third parties upon whom we depend may be adversely affected by natural disasters, including earthquakes, fires, typhoons, and floods, public health epidemics, telecommunications or electrical failures, geo-political actions, including war and terrorism, political and economic instability, and other events beyond our control, and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

We or our partners, CROs, CDMOs, or other service providers, may experience interruptions to our operations, including the conduct of our research and development programs, clinical trials, and manufacturing operations, due to natural disasters, including earthquakes, fires, typhoons, and floods, public health epidemics, such as the COVID-19 pandemic, hardware, software, telecommunication or electrical failures, geo-political actions, including war and terrorism, or political and economic instability, which could significantly disrupt or harm our business.

Our corporate headquarters and other facilities, including the site of our planned manufacturing facility, are located in areas that have experienced significant natural disasters, including the San Francisco Bay Area and Seattle, Washington, each of which have experienced severe effects from wildfires and, in the case of the San Francisco Bay Area, severe earthquakes. We do not carry earthquake insurance. Earthquakes, wildfires, or other natural disasters could severely disrupt our operations, and could materially and adversely affect our business, financial condition, results of operations, and prospects. If a natural disaster, electrical failure, or other event occurs that prevents us from using all or a significant portion of our headquarters, damages critical infrastructure, or otherwise disrupts operations, it may be difficult or, in certain cases, impossible, for us to continue our business for a substantial period of time. For example, a prolonged electrical failure could result in damage to or destruction of materials that are critical for our research and manufacturing operations, including our master cell banks, which would delay the advancement of our programs and materially harm our business, operating results, prospects, or financial condition. In addition, a failure of our computing systems could result in the loss of research or preclinical data important to our research or development programs, interrupt the conduct of ongoing research, or otherwise impair our ability to operate, which could delay the advancement of our programs or cause us to incur costs to recover or reproduce lost data. In addition, if in the future a natural disaster, power outage, or other event occurred that prevented us from using all or a significant portion of our manufacturing capabilities, we may not be able to manufacture sufficient supply of our product candidates required to conduct our clinical trials or commercialize our products in accordance with our timelines or at all. The disaster recovery and business continuity plans we currently have in place are limited and are unlikely to prove adequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which, together with our lack of earthquake insurance in particular, could have a material adverse effect on our business.

Integral parties in our supply chain are similarly vulnerable to natural disasters or other sudden, unforeseen, and severe adverse events. In addition, our supply chain is vulnerable to changes in the geo-political and economic climate, including changes in relationships between the United States and countries from which we may need to source materials and other resources necessary for the preclinical evaluation of our product candidates, including animal models, and specifically non-human primate models, or to manufacture our product candidates, including raw and intermediate materials and consumables. If any such event or change were to affect our supply chain, it could have a material adverse effect on our business.

As a result of the COVID-19 pandemic and related public health guidance measures, we experienced and may in the future experience disruptions that could materially and adversely impact our preclinical and clinical studies and development and our business, financial condition, and results of operations. Potential disruptions resulting from the COVID-19 pandemic or another pandemic, epidemic, or infectious disease outbreak may include delays or disruptions in our research, preclinical, clinical, manufacturing, and regulatory activities, including due to limitations on employee or other resources both internally and at third parties, including government agencies, or delays in procuring, or inability to procure, necessary supplies, materials, and equipment. The extent to which the impact of the COVID-19 pandemic and any other pandemic, epidemic, or other outbreak may affect our preclinical studies, clinical trials, business, financial condition, and results of operations will depend on future developments, which continue to be highly uncertain and unpredictable.

Furthermore, geo-political actions, such as the conflicts in Ukraine and the Middle East, trade restrictions, and the resulting political and economic instability, could negatively impact our operations. Although it is difficult to anticipate the impact of any of the foregoing on our company in particular, such geo-political actions, and any actions taken in response thereto, could increase our costs, disrupt our supply chain, impair our ability to raise or access additional capital when needed on acceptable terms, if at all, or otherwise adversely affect our business, financial condition, and results of operations.

If securities or industry analysts either do not publish research about us or publish inaccurate or unfavorable research about us, our business, our market, or our competitors, or if they adversely change their recommendations regarding our common stock, the trading price or trading volume of our common stock could decline.

The trading market for our common stock is influenced in part by the research and reports that securities or industry analysts may publish about us, our business, our market, or our competitors. We do not have any control over the analysts or the content and opinions included in their research and reports. If one or more of these analysts issue an unfavorable rating or downgrade our common stock, provide a more favorable recommendation about our competitors, or publish inaccurate or unfavorable research about our business, our common stock price would likely decline. If any analyst who may cover us were to cease such coverage or fail to regularly publish reports on us, we could lose visibility in the financial markets and demand for our common stock could decrease, which could cause the trading price or trading volume of our common stock to decline.

We are an emerging growth company, and any decision on our part to comply only with certain reduced reporting and disclosure requirements applicable to emerging growth companies could make our common stock less attractive to investors.

We are an “emerging growth company” as defined in the JOBS Act, and, for as long as we continue to be an emerging growth company, we may choose to take advantage of exemptions from various reporting requirements applicable to other public companies but not to emerging growth companies, including:

- not being required to have our independent registered public accounting firm audit our internal control over financial reporting under Section 404 of the Sarbanes-Oxley Act of 2002 (the Sarbanes-Oxley Act);
- reduced disclosure obligations regarding executive compensation in our periodic reports and annual reports on Form 10-K; and
- exemptions from the requirements of holding non-binding advisory votes on executive compensation and stockholder approval of any golden parachute payments not previously approved.

Our status as an emerging growth company will end as soon as any of the following takes place:

- the last day of the fiscal year in which we have more than $1.235 billion in annual revenue;
- the date we qualify as a “large accelerated filer,” with at least $700 million of equity securities held by non-affiliates;
- the date on which we have issued, in any three-year period, more than $1.0 billion in non-convertible debt securities; or
- the last day of the fiscal year ending after the fifth anniversary of the completion of our IPO, which is December 31, 2026.

We cannot predict if investors will find our common stock less attractive as a result of our decision to rely on any of the exemptions afforded to emerging growth companies. If some investors find our common stock less attractive because we rely on any of these exemptions, there may be a less active trading market for our common stock and the market price of our common stock may be more volatile.

Under the JOBS Act, emerging growth companies can also delay adopting new or revised accounting standards until such time as those standards apply to private companies. We have elected to use this extended transition period for any new or revised accounting standards during the period in which we remain an emerging growth company (or we affirmatively and irrevocably opted out of the extended transition period); however, we may adopt certain new or revised accounting standards early. As a result, these financial statements may not be comparable to companies that comply with the new or revised accounting pronouncements as of public company effective dates.

The requirements of being a public company may strain our resources, result in an increased risk of litigation, and divert management's attention.

As a public company, we are subject to the reporting requirements of the Exchange Act, the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of Nasdaq, and other applicable securities rules and regulations. Complying with these rules and regulations has increased and will increase our legal and financial compliance costs, make some activities more difficult, time-consuming, or costly, and increase demand on our systems and resources. The Exchange Act requires, among other things, that we file annual, quarterly, and current reports with respect to our business and operating results. The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal control over financial reporting. We are required to disclose changes made in our internal control and procedures on a quarterly basis. In order to maintain and, if required, improve our disclosure controls and procedures and internal control over financial reporting to meet the requirements of the Sarbanes-Oxley Act, significant resources and management oversight may be required. As a result, management's attention may be diverted from other business concerns, which could adversely affect our business and operating results. We may also need to hire additional employees or engage outside consultants to comply with these requirements, which will increase our costs and expenses.

In addition, changing laws, regulations, and standards relating to corporate governance and public disclosure create uncertainty for public companies, increase legal and financial compliance costs, and make some activities more time-consuming. These laws, regulations, and standards are 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. We intend to continue to invest resources to comply with evolving laws, regulations, and standards, and this investment may result in increased general and administrative expenses and a diversion of management's time and attention from potential revenue-generating activities to compliance activities. If our efforts to comply with new laws, regulations, and standards fail to meet the requirements of the applicable regulatory or governing bodies, including due to ambiguities related to their application in practice, regulatory authorities may initiate legal proceedings against us, and our business may be adversely affected.

New laws, rules, and standards and our efforts necessary to comply may make it more expensive for us to obtain director and officer liability insurance and, in the future, we may be required to accept reduced coverage or incur substantially higher costs to obtain coverage. These factors could also make it more difficult for us to attract and retain qualified members of our board of directors, particularly to serve on our audit committee and compensation and talent committee, and qualified executive officers. Additionally, the dramatic increase in the cost of such insurance may cause us to opt for lower overall policy limits or to forgo insurance that we may otherwise rely on to cover defense costs, settlements, and damages awarded to plaintiffs in connection with any securities litigation.

By disclosing information in the periodic filings required of a public company, our business and financial condition are more visible, which we believe may result in threatened or actual litigation, including by competitors and other third parties. If those claims are successful, our business could be seriously harmed. Even if the claims do not result in litigation or are resolved in our favor, the time and resources needed to resolve them could divert our management's resources and seriously harm our business.

If we fail to maintain proper and effective internal controls over financial reporting, our ability to produce accurate and timely financial statements could be impaired.

Pursuant to Section 404 of the Sarbanes-Oxley Act, our management is required to report upon the effectiveness of our internal control over financial reporting. When we lose our status as an "emerging growth company," our independent registered public accounting firm will be required to attest to the effectiveness of our internal control over financial reporting. The rules governing the standards that must be met for management to assess our internal control over financial reporting are complex and require significant documentation, testing, and possible remediation. To comply with the requirements of being a reporting company under the Exchange

Act, we have implemented and may need to continue to implement additional financial and management controls, reporting systems, and procedures, and may need to hire additional accounting and finance staff.

We cannot guarantee that there will not be material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition, results of operations, or cash flows. If we are unable to conclude that our internal control over financial reporting is effective, or if our independent registered public accounting firm determines we have a material weakness or significant deficiency in our internal control over financial reporting, investors may lose confidence in the accuracy and completeness of our financial reports, the market price of our common stock could decline, and we could be subject to sanctions or investigations by Nasdaq, the SEC, or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

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

We are subject to the periodic reporting requirements of the Exchange Act. We must design our disclosure controls and procedures to reasonably assure that information we must disclose in reports we file or submit under the Exchange Act is accumulated and communicated to management, and recorded, processed, summarized, and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures or internal controls and procedures, no matter how well-conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. For example, our directors or executive officers could inadvertently fail to disclose a new relationship or arrangement with a related party, which could cause us to fail to make a required related party transaction disclosure. Additionally, controls can, depending on the circumstances, be circumvented by the acts of a single individual, by collusion of two or more people, or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements due to error or fraud may occur and not be detected.

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 United Kingdom or European Union, result in restrictions or imposition of taxes and duties for importing our product candidates into the United Kingdom or European Union, and may require us to incur additional expenses in order to develop, manufacture, and commercialize our product candidates in the United Kingdom or European Union.

The UK left the EU on January 31, 2020, commonly referred to as "Brexit." Pursuant to the formal withdrawal arrangements agreed between the UK and EU, the UK and EU negotiated a framework for partnership for the future in their Trade and Cooperation Agreement (TCA), which became effective on January 1, 2021. The TCA includes specific provisions concerning pharmaceuticals, including the mutual recognition of cGMP inspections of manufacturing facilities for medicinal products and cGMP documents issued, but does not foresee wholesale mutual recognition of UK and EU pharmaceutical regulations.

Because a significant proportion of the regulatory framework in the UK applicable to our business and our product candidates is derived from EU directives and regulations, Brexit could materially impact the regulatory regime with respect to the development, manufacture, importation, approval, and commercialization of our product candidates in the UK. In general, the EU laws that have been transposed into UK law through secondary legislation remain applicable in Great Britain. However, these rules may have diverged or may in the future diverge from the EU rules, and general uncertainty regarding the future of the relationship between the UK and EU, as well as the laws and rules in each such jurisdiction, remains.

As of January 1, 2021, the Medicines and Healthcare Products Regulatory Agency (MHRA) is the UK's standalone medicines and medical devices regulator. As a result of the Northern Ireland protocol, different rules apply in Northern Ireland than in Great Britain; broadly, Northern Ireland continues to follow the EU regulatory regime, but its national competent authority remains the MHRA. However, on February 27, 2023, the UK Government and the European Commission reached political consensus on the "Windsor Framework," which will revise the Northern Ireland protocol in order to address some of the perceived shortcomings. Under the proposed changes, Northern Ireland would be reintegrated under the regulatory authority of the MHRA with respect to medicinal products. The implementation of the Windsor Framework will occur in various stages, with new arrangements relating to the supply of medicines into Northern Ireland due to take effect in 2025. There could be additional uncertainty and risk around what these changes will mean for any of our business operations in the UK.

Following the Transition Period, the UK is no longer covered by the centralized procedures for obtaining EU-wide marketing authorization from the EMA and companies established in the UK must follow one of the UK national authorization procedures or one of the remaining post-Brexit international cooperation procedures to obtain marketing authorization to commercialize a product in the UK. The MHRA may rely on a decision taken by the European Commission with respect to the approval of a new (centralized procedure) marketing authorization when making a determination with respect to an application for a Great Britain marketing authorization, or use the MHRA's decentralized or mutual recognition procedures, which enable marketing authorizations approved in EU member states (or Iceland, Liechtenstein, or Norway) to be granted in Great Britain. Any delay in obtaining, or an inability to obtain, any marketing approvals in the UK or EU, as a result of Brexit or otherwise, could prevent us from commercializing our product candidates in the UK or EU and restrict our ability to generate revenue and achieve and sustain profitability. In addition, we may be required to pay taxes or duties or be subjected to other requirements, some of which could be significant, in connection with the importation of our product candidates into the UK or EU, or we may incur expenses in establishing a manufacturing facility in the UK or EU in order to circumvent such requirements. If any of these outcomes occur, we may be forced to restrict or delay efforts to seek regulatory approval for our product candidates in the UK or EU or incur significant additional expenses to operate our business, which could significantly and materially harm or delay our ability to generate revenues or achieve profitability. 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 UK.

Item 1B. Unresolved Staff Comments.

None.

Item 1C. Cybersecurity.

Risk Management and Strategy

We have established policies and processes for assessing, identifying, and managing material risk from cybersecurity threats, and have integrated these processes into our overall risk management systems and processes. We routinely assess material risks from cybersecurity threats, including any potential unauthorized occurrence on or conducted through our information systems that may result in adverse effects on the confidentiality, integrity, or availability of our information systems or any information residing therein.

We conduct periodic risk assessments to identify cybersecurity threats. These risk assessments include identification of reasonably foreseeable internal and external risks, the likelihood and potential damage that could result from such risks, and the sufficiency of existing policies, procedures, systems, and safeguards in place to manage such risks.

Following these risk assessments, we evaluate whether and how to re-design, implement, and maintain reasonable safeguards to minimize identified risks; reasonably address any identified gaps in existing safeguards; and regularly monitor the effectiveness of our safeguards. We devote significant resources and designate personnel, including our Head of Information Security, who reports to our Vice President, Information Technology, to manage the risk assessment and mitigation process.

As part of our overall risk management system, we monitor and test our safeguards and train relevant personnel on these safeguards. These efforts are led by our Information Security group. All personnel are expected to engage in security awareness training. We engage third parties to perform security assessments to test our safeguards and, when appropriate, implement modifications to or add new safeguards based on the results of such assessments.

We generally require each of our relevant third-party service providers to implement and maintain appropriate security measures and to promptly notify us of any suspected breach of security that may affect our company. For additional information regarding whether any risks from cybersecurity threats, including as a result of any previous cybersecurity incidents, have materially affected or are reasonably likely to materially affect our company, including our business strategy, results of operations, or financial condition, please refer to Item 1A, “Risk Factors,” in this Annual Report.

Governance

One of the key functions of our board of directors is informed oversight of our risk management process, including risks from cybersecurity threats. Our board of directors is responsible for monitoring and assessing strategic risk exposure, and our executive officers and other members of senior management are responsible for the day-to-day management of the material risks we face. Our board of directors administers its cybersecurity risk oversight function directly as well as through our audit committee.

Our Head of Information Security is primarily responsible for assessing and managing our material risks from cybersecurity threats. He has worked in various roles pertaining to cybersecurity for more than fifteen years and possesses a Certified Information Systems Security Professional (CISSP) certification.

Our Head of Information Security oversees our cybersecurity policies and processes, including those described above under “Risk Management and Strategy.” The processes by which he is informed about and monitors the prevention, detection, mitigation, and remediation of cybersecurity incidents include the following: vulnerability management, third party risk management, data security management, security awareness training, systems management, operations security, security incident and event management, and incident response management. We utilize third parties for managed detection and active response to cybersecurity incidents.

Our Head of Information Security provides quarterly briefings to our audit committee regarding our cybersecurity risks and activities, such as any recent cybersecurity incidents and related responses (including those of third parties), if any, and cybersecurity systems testing. Our audit committee provides periodic updates to the board of directors that include any material information included in such briefings. In addition, our Head of Information Security provides annual briefings to our board of directors on cybersecurity risks and activities.

Item 2. Properties.

Washington

Our corporate headquarters are located in Seattle, Washington, where we lease 25,898 square feet of office and laboratory space pursuant to a lease agreement that commenced in March 2019 and expires in December 2026, and includes an option to extend for an additional five-year term. We sublease an additional 22,188 square feet of office and laboratory space in the same building, pursuant to a sublease agreement which commenced in September 2020 and expires in April 2028. In June 2022, we entered into a lease agreement for 79,565 square feet of space located in Bothell, Washington, which will be used as office and laboratory space and for the construction of a GMP manufacturing facility (the Bothell facility). The lease agreement has an initial term of 16 years expiring in January 2039 and includes an option to extend for up to three additional five-year terms.

California

We occupy 66,075 square feet of office, laboratory, and manufacturing space in South San Francisco, California, pursuant to a lease agreement that commenced in December 2019 and expires in April 2030, and includes the option to extend for an additional five-year term. We sublease an additional 32,909 square feet of office and laboratory space in the same building, pursuant to a sublease agreement that commenced in April 2022 and expires in April 2030.

Massachusetts

We lease 24,386 square feet of office and laboratory space in Cambridge, Massachusetts pursuant to a lease agreement that commenced in March 2019 and expires in June 2027 and sublease an additional 31,563 square feet of similar space in an adjacent building pursuant to a sublease agreement that commenced in January 2020 and expires in February 2028.

We believe that our existing facilities are sufficient for our near-term needs but expect to need additional space as we grow. We believe that suitable additional alternative spaces will be available in the future on commercially reasonable terms, if required.

Item 3. Legal Proceedings.

We are not currently a party to any material legal proceedings. From time to time, we may, however, in the ordinary course of business face various claims brought by third parties, including claims relating to employment matters and the safety and efficacy of our products, and we may, from time to time, make claims or take legal action to assert our rights, including action relating to our intellectual property rights. Any of these claims could subject us to costly litigation. While we generally believe that we have adequate insurance to cover many different types of liabilities from third party claims, our insurance carriers may deny coverage, may be inadequately capitalized to pay on valid claims, or our policy limits may be inadequate to fully satisfy any damage awards or settlements. If this were to happen, the payment of any such awards could have a material adverse effect on our operations, cash flows, or financial position. Additionally, any such claims, whether or not successful, could damage our reputation and business.

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 "SANA."

Holders

As of February 22, 2024, there were approximately 45 holders of record of our common stock. The actual number of stockholders is greater than this number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

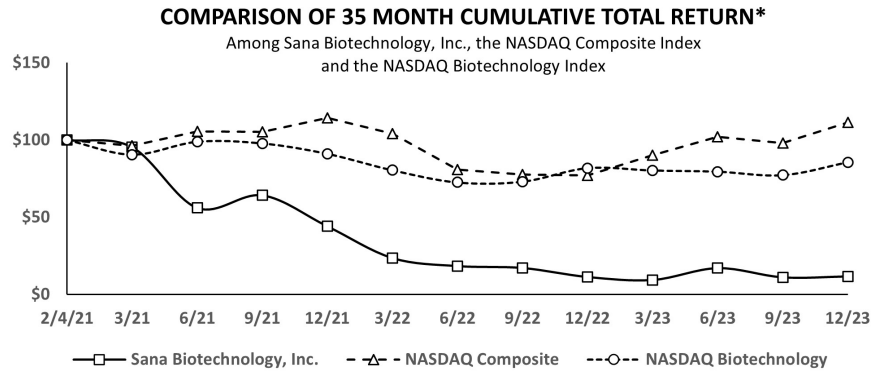
Dividend Policy

We have not declared or paid cash dividends on our capital stock since our inception. We intend to retain future earnings, if any, to finance the operation and expansion of our business and do not anticipate paying any cash dividends to holders of common stock in the foreseeable future.

Stock Performance Graph

The following stock performance graph and related information shall not be deemed to be "soliciting material" or to be "filed" with the SEC, for purposes of Section 18 of the Exchange Act, nor shall such information be incorporated by reference into any future filing under the Exchange Act or the Securities Act, except to the extent that we specifically incorporate it by reference into such filing.

The graph set forth below compares the cumulative total stockholder return on our shares of common stock between February 4, 2021 (the first day that our common stock began trading on the Nasdaq Global Select Market) and December 31, 2023, with the cumulative total return of (a) the Nasdaq Composite Index and (b) the Nasdaq Biotechnology Index, over the same period. This graph assumes the investment of $100 on February 4, 2021 in our common stock, the Nasdaq Composite Index, and the Nasdaq Biotechnology Index, and assumes the reinvestment of dividends, if any. The graph uses the closing sales price of our common stock of $35.10 per share on February 4, 2021 as the initial value of our common stock. The comparisons shown in the graph below are based upon historical data. The stock price performance included in this graph is not necessarily indicative of future stock price performance.



*$100 invested on February 4, 2021 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31

Securities Authorized for Issuance Under Equity Compensation Plans

Information about our equity compensation plans is incorporated herein by reference to Item 12 of Part III of this Annual Report.

Recent Sales of Unregistered Securities

We did not sell any unregistered securities in the year ended December 31, 2023.

Use of Proceeds from our Initial Public Offering of Common Stock

On February 3, 2021, our Registration Statement on Form S-1 (File No. 333-252061) relating to our IPO was declared effective._On February 8, 2021, we closed our IPO and issued 27.0 million shares of common stock, including 3.5 million shares of common stock sold pursuant to the underwriters' full exercise of their option to purchase additional shares, at a public offering price of $25.00 per share, for aggregate net proceeds of $626.4 million. Morgan Stanley & Co. LLC, Goldman Sachs & Co. LLS, J.P. Morgan Securities LLC, and BofA Securities, Inc. acted as joint bookrunning managers of the IPO and as representatives of the underwriters. No offering expense were paid directly or indirectly to any of our directors or officers (or their associates) or persons owning 10.0% or more of any class of our equity securities or to any other affiliates.

We hold a significant portion of the balance of the net proceeds from the offering in money market funds and short-term investments in accordance with our investment policy. There has been no material change in the planned use of the net proceeds from the IPO from that described in the prospectus filed with the SEC pursuant to Rule 424(b)(4) under the Securities Act.

Issuer Purchases of Equity Securities

Not applicable.

Item 6. Reserved

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 audited consolidated financial statements and the related notes included elsewhere in this Annual Report. This discussion and analysis and other parts of this Annual Report contain forward-looking statements that are based upon current beliefs, plans, and expectations related to future events and our future financial performance that involve risks, uncertainties, and assumptions, such as statements regarding our intentions, plans, objectives, and expectations for our business. Our actual results and the timing of selected events could differ materially from those described in or implied by these forward-looking statements as a result of numerous factors, including those set forth in the section of this Annual Report titled "Risk Factors." See also the section of this Annual Report titled "Special Note Regarding Forward-Looking Statements."

Overview

We were founded on the belief that engineered cells will be one of the most important transformations in medicine over the next several decades. The burden of diseases that can be addressed at their root cause through engineered cells is significant. We view engineered cells as having the potential to be as therapeutically disruptive as biologic drugs to clinical practice. The key to making this vision a reality will be finding consistent and scalable means of manufacturing cell-based medicines, and we have invested significantly in our hypoimmune platform (HIP) technology with the twin goals of using allogeneic cells that evade immune detection in patients and that we can manufacture at scale. We are developing cell engineering programs to revolutionize treatment across a broad array of therapeutic areas with unmet treatment needs, including oncology, diabetes, B-cell-mediated autoimmune, and central nervous system disorders, among others.

We currently have four clinical trials that are ongoing, or that we expect to commence in the near-term, evaluating our product candidates, or product candidates developed using our technologies, across seven diseases in multiple therapeutic areas, including B-cell malignancies, B-cell-mediated autoimmune disease, and type 1 diabetes, as described below.

- **ARDENT** is an ongoing Phase 1 clinical trial evaluating SC291, our HIP-modified CD19 targeted allogeneic chimeric antigen receptor (CAR) T program, in B-cell malignancies, including non-Hodgkin's lymphoma and chronic lymphoblastic leukemia;
- **GLEAM** is a Phase 1 clinical trial evaluating SC291 in patients with lupus nephritis, extrarenal lupus, and antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis;
- **VIVID** is a Phase 1 clinical trial evaluating SC262, our HIP-modified CD22 CAR T program, in patients with relapsed or refractory B-cell malignancies who have received prior CD19 CAR T therapy; and
- Investigator-sponsored first-in-human study (IST) evaluating UP421 an allogeneic, primary islet cell therapy engineered with our HIP technology, in patients with type 1 diabetes mellitus.

We seek to overcome several existing limitations of gene and cell therapy through our *ex vivo* and *in vivo* cell engineering platforms, both of which may facilitate the development of therapies that can transform the lives of patients by repairing cells in the body when possible and replacing them when needed. For *ex vivo* therapies, when diseased cells are damaged or missing entirely and an effective therapy needs to replace the entire cell, a successful therapeutic requires large-scale manufacturing of cells that engraft, function, and persist in the body. Of these, we view cell persistence as the greatest current limitation to dramatically expanding the impact of this class of therapeutics, and in particular, overcoming the barrier of immune rejection of transplanted allogeneic cells. We believe that product candidates developed with our *ex vivo* cell engineering platform, which uses HIP-modified allogeneic cells that can "hide" from the patient's immune system, can address this fundamental limitation and unlock a wave of disruptive therapeutics. We refer to this technology as our hypoimmune platform. For *in vivo* therapies that aim to repair and control genes in the body, a successful product candidate requires both gene modification and *in vivo* delivery of the therapeutic payload. Of these, we view effective *in vivo* delivery as the greatest current limitation to dramatically expanding the impact of this class of therapeutics. To this end, our initial focus is on cell-specific delivery of genetic payloads. Based upon early clinical as well as extensive preclinical data from our HIP platform, we decided in October 2023 to focus a meaningful portion of our research and development resources for at least the next several years ion HIP-modified *ex vivo* manufactured cells as therapeutics.

We believe the time is right to develop engineered cell therapies across a broad range of therapeutic areas. Substantial progress in the understanding of genetics, gene editing, protein engineering, stem cell biology, immunology, process analytics, and computational biology have converged to create an opportunity to markedly increase the breadth and depth of the potential impact of cellular medicines. We continue to make progress developing our *ex vivo* cell engineering platforms – our hypoimmune allogeneic CAR T cell platform and our stem-cell derived platform that also leverages our HIP technology. We are in the early stages of development across a broad pipeline of product candidates, which are summarized below:

[1]Investigator sponsored trial.
Abbreviations: AAV, ANCA-associated vasculitis; CLL, chronic lymphocytic leukemia; ERL, extrarenal systemic lupus erythematosus; HD, Huntington's disease; LN, lupus nephritis; MM, multiple myeloma; NHL, non-Hodgkin lymphoma; PMD, Pelizaeus-Merzbacher Disease; SPMS, secondary progressive multiple sclerosis; T1D, type 1 diabetes; WW, worldwide.

Each of our initial programs provides the potential for meaningful standalone value while also supporting our potential ability to further exploit our platforms in a manner that leads to the development of broadly applicable medicines. Based on our current timelines for our lead programs, we believe our cash runway will enable multiple data readouts across our programs.

In 2023 and 2024, the FDA cleared our Investigational New Drug (IND) applications for each of the ARDENT, GLEAM, and VIVID trials, and we supported the submission of a clinical trial application for an IST, which was authorized by the Swedish Medical Products Agency. These four trials will evaluate our product candidates across seven diseases in multiple therapeutic areas, including B-cell malignancies, B cell-mediated autoimmune diseases, and type 1 diabetes. We expect to share data from each of these trials in 2024.

Additionally, we continue to make progress on advancing our research- and preclinical-stage product candidates into and through preclinical development and toward potential IND submissions in 2024 and beyond. As certain of our product candidates advance toward potential IND submissions, we are conducting good laboratory practices toxicity studies and establishing necessary scale-up for our manufacturing processes.

Given the depth and breadth of our portfolio, we expect to assess and prioritize our programs on an ongoing basis based on various factors, including internal and external opportunities and constraints, which may result in our decision to advance certain programs ahead or instead of others. For details regarding our product candidates and programs, see the section titled “Business— Overview” in Part I, Item 1 included elsewhere in this Annual Report.

Our *ex vivo* and *in vivo* technologies represent an aggregation of years of innovation and technology from multiple academic institutions and companies, including hypoimmune technology licensed from the President and Fellows of Harvard College (Harvard) and The Regents of the University of California, our *ex vivo* cell engineering program focused on certain brain disorders acquired from Oscine Corp., fusogen technology acquired from Cobalt Biomedicines Inc. (Cobalt), and gene editing technology licensed from Beam Therapeutics Inc. (Beam), among others. For details regarding these acquisitions and license and collaboration agreements, see Note 3, Acquisitions and Note 4, License and collaboration agreements, to our consolidated financial statements included in this Annual Report, as well as the section titled “Business— Key Intellectual Property Agreements” in Part I, Item 1 included elsewhere in this Annual Report.

Our operations to date have included developing our *ex vivo* and *in vivo* cell engineering platforms, identifying and developing potential product candidates, executing preclinical studies, establishing manufacturing capabilities, conducting clinical trials of our product candidates, supporting clinical trials of product candidates developed using our technologies, acquiring technology, organizing and staffing the company, business planning, establishing and maintaining our intellectual property portfolio, raising capital, and providing general and administrative support for these operations. All of our programs are currently in the development stage, and we do not have any products approved for sale. Since our inception, we have incurred net losses each year. Our net losses for the years ended December 31, 2023, 2022, and 2021 were $283.3 million, $269.5 million, and $355.9 million, respectively. As of December 31, 2023, we had an accumulated deficit of $1.3 billion, which includes cumulative non-cash charges of $10.3 million and $58.3 million related to the revaluation of the success payment and contingent consideration liabilities, respectively. Our net losses resulted primarily from our research and development programs, and, to a lesser extent, general and administrative costs associated with our operations.

In February 2024, we completed an underwritten public offering pursuant to which we sold 21.8 million shares of our common stock, including 4.5 million shares pursuant to the full exercise of the underwriters' option to purchase additional shares, and pre-funded warrants to purchase 12.7 million shares of our common stock for net proceeds of approximately $179.9 million, after deducting underwriting discounts and commissions and estimated offering expenses.

In August 2022, we entered into a sales agreement with Cowen and Company, LLC (Cowen), acting as sales agent, pursuant to which we may offer and sell through Cowen up to $150.0 million in shares of our common stock from time to time in a series of one or more at the market equity offerings (collectively, the ATM facility). To date we sold an aggregate of 4.9 million shares of our common stock under the ATM facility for net proceeds of $28.7 million after deducting commissions and expenses.

In February 2021, we completed our initial public offering (IPO) and issued 27.0 million shares of our common stock, including 3.5 million shares pursuant to the full exercise of the underwriters’ option to purchase additional shares, for net proceeds of $626.4 million after deducting underwriting discounts and commissions and estimated offering expenses. Prior to the IPO, we funded our operations from the issuance and sale of our convertible preferred stock, raising an aggregate of $705.0 million in net proceeds.

As of December 31, 2023, we had cash, cash equivalents, and marketable securities of $205.2 million. Based on our current operating plan, we believe that our existing cash, cash equivalents, and marketable securities will be sufficient to meet our working capital and capital expenditure needs for at least the next 12 months from the filing of this Annual Report.

We expect our operating losses and expenses to decrease in 2024, excluding potential one-time items, as a result of our strategic repositioning in October 2023, and likely increase over the longer term from the 2024 level if our clinical trials are successful, and if we expand our research and development efforts. Cost increases would be driven in large part by advancing our current and future product candidates into and through clinical trials; identifying additional product candidates; establishing our manufacturing capabilities, including through third-party contract development and manufacturing organizations (CDMOs) and building our internal manufacturing capabilities; advancing preclinical development of our current and future product candidates; advancing and expanding the capabilities of our *ex vivo* and *in vivo* cell engineering platforms; acquiring and licensing technologies aligned with our ambition of translating engineered cells to medicines; seeking regulatory approval of our current and future product candidates; increasing our workforce to support our research, clinical and preclinical development, manufacturing, and commercialization efforts; expanding our operational, financial, and management systems; continuing to develop, prosecute, and defend our intellectual property portfolio; and continuing to incur legal, accounting, or other expenses to operate our business, including the costs associated with being a public company.

We continue to invest in building world class capabilities in key areas of manufacturing sciences and operations, including development of our cell engineering platforms, product characterization, and process analytics. Our investments also include scaled research solutions, scaled infrastructure, and novel technologies to improve efficiency, characterization, and scalability of manufacturing, including establishing our internal manufacturing capabilities.

In October 2023, we announced a strategic repositioning to increase our focus on our *ex vivo* cell therapy product candidates. As a result, we reduced our near-term investment in our fusogen platform for *in vivo* gene delivery, including by delaying the IND submission for our SG299 program. The strategic repositioning resulted in a workforce reduction of approximately 29%. We incurred approximately $5.2 million of cash-based expenses related to employee severance, benefits, and related costs. The strategic repositioning and associated workforce reduction is substantially complete, and is expected to result in 2024 operating cash burn of less than $200.0 million.

We anticipate that we will need to raise additional financing in the future to fund our operations, including the commercialization of any approved product candidates. Until such time, if ever, as we can generate substantial product revenue, we expect to finance our operations with our existing cash, cash equivalents, and marketable securities, proceeds from any future equity or debt financings, and upfront, milestone, and royalty payments received under any future licenses, collaborations, or other arrangements. Additional capital may not be available on terms that are reasonable or acceptable to us, if at all. If we are unable to raise capital when needed or on attractive terms, our business, results of operations, and financial condition would be adversely affected.

Macroeconomic Considerations

Our business and operations may be negatively affected by worldwide economic conditions, which may continue to be impacted by global macroeconomic challenges such as the timing of changes to inflation and interest rates, declines in consumer confidence, declines in economic growth, uncertainty in the markets, geo-political and economic stability resulting from the ongoing Russia-Ukraine war, conflict in the Middle East, tensions in U.S.-China relations, and the aftermath of the COVID-19 pandemic. The severity and duration of the impact of these events and conditions on our business cannot be predicted and may not be fully reflected in our results of operations until future periods. If economic uncertainty continues or increases, or if the global economy worsens, our business, financial condition, and results of operations may be harmed. For further discussion of the potential impacts of macroeconomic events and conditions on our business, financial condition, and operating results, see the section of this Annual Report titled “Risk Factors.”

Acquisitions

We have completed various acquisitions since inception. For details regarding our acquisitions, see the section titled “Business—Key Intellectual Property Agreements” and Note 3, Acquisitions, to our consolidated financial statements included elsewhere in this Annual Report.

License and collaboration agreements

We have entered into license and collaboration agreements with various third parties. For details regarding these agreements, see the section titled “Business— Key Intellectual Property Agreements” and Note 4, License and collaboration agreements, to our consolidated financial statements included elsewhere in this Annual Report.

Success payments and contingent consideration

Cobalt success payment and contingent consideration

Pursuant to the terms and conditions of the Cobalt acquisition agreement, we are obligated to pay to certain former Cobalt stockholders contingent consideration (Cobalt Contingent Consideration) of up to an aggregate of $500.0 million upon our achievement of certain specified development milestones and a success payment (Cobalt Success Payment) of up to $500.0 million, each of which is payable in cash or stock. The Cobalt Success Payment is payable if, at pre-determined valuation measurement dates, our market capitalization equals or exceeds $8.1 billion, and we are advancing a program based on the fusogen technology in a clinical trial pursuant to an IND, or have filed for, or received approval for, a biologics license application or new drug application for a product based on the fusogen technology. The Cobalt Success Payment can be achieved over a maximum of 20 years from the date of the acquisition, but this period could be shorter upon the occurrence of certain events. A valuation measurement date would also be triggered upon a change of control if at least one of our programs based on the fusogen technology is the subject of an active research program at the time of such change of control. If there is a change of control and our market capitalization is below $8.1 billion as of the date of such change of control, the amount of the potential Cobalt Success Payment will decrease, and the amount of potential Cobalt Contingent Consideration will increase. As of December 31, 2023, a Cobalt Success Payment had not been triggered.

See Note 3, Acquisitions to our consolidated financial statements included elsewhere in this Annual Report for details on the amount of the potential Cobalt Success Payment and potential Cobalt Contingent Consideration if there is a change of control based on various thresholds for our market capitalization on such change of control date. See the subsections below titled "—Success payments" and "—Contingent consideration" for more information on the accounting treatment of the Cobalt Success Payment and Cobalt Contingent Consideration.

Harvard success payments

Pursuant to the terms of the Harvard agreement, we may be required to make up to an aggregate of $175.0 million in success payments to Harvard (Harvard Success Payments), payable in cash, based on increases in the per share fair market value of our common stock. The potential Harvard Success Payments are based on multiples of increasing value ranging from 5x to 40x based on a comparison of the per share fair market value of our common stock relative to the original issuance price of $4.00 per share at ongoing pre-determined valuation measurement dates. The Harvard Success Payments can be achieved over a maximum of 12 years from the effective date of the agreement. If a higher success payment tier is met at the same time a lower tier is met, both tiers will be owed. Any previous Harvard Success Payments made are credited against the Harvard Success Payment owed as of any valuation measurement date so that Harvard does not receive multiple success payments in connection with the same threshold. As of December 31, 2023, a Harvard Success Payment had not been triggered.

See Note 4, License and collaboration agreements to our consolidated financial statements included elsewhere in this Annual Report for more details on the various per share common stock values that trigger a Harvard Success Payment. See the subsection below titled "—Success payments" for more information on the accounting treatment of the Harvard Success Payments.

Components of operating results

Operating expenses

Research and development

To date, research and development expenses have related primarily to discovery and development of our platform technologies and product candidates. Research and development expenses are recognized as incurred, and payments made prior to the receipt of goods or services to be used in research and development are recorded as prepaid expenses until the goods or services are received.

Research and development expenses consist of personnel-related costs, including salaries, benefits, and non-cash stock-based compensation, external research and development expenses incurred under arrangements with third parties, including CDMO manufacturing costs (including pass-through costs) and clinical trial costs, costs for laboratory supplies, costs to acquire and license technologies aligned with our goal of translating engineered cells to medicines, and facility expenses, including rent and depreciation, and allocated overhead costs. The timing and amount of costs to acquire and license technologies in the future cannot be reliably estimated and may fluctuate from quarter to quarter and year to year.

We deploy our employee and infrastructure resources across multiple research and development programs for developing our *ex vivo* and *in vivo* cell engineering platforms, identifying and developing product candidates, and establishing manufacturing capabilities. Due to our early stage of development, the number of ongoing projects, and our ability to use resources across several projects, most of our research and development costs are not recorded on a program-specific basis. These include costs for personnel, laboratory, and other indirect facility and operating costs.

Research and development activities account for a significant portion of our operating expenses. As a result of our strategic repositioning in October 2023, we anticipate that our research and development expenses will decrease in 2024, excluding potential one-time items, and likely increase over the longer term from the 2024 level if our clinical trials are successful and if we expand our research and development efforts. Cost increases would be driven in large part by advancing our current and future product candidates into and through clinical trials; identifying additional product candidates; establishing internal and external manufacturing capabilities; advancing preclinical development of our current and future product candidates; advancing and expanding the capabilities of our *ex vivo* and *in vivo* cell engineering platforms; acquiring and licensing technologies aligned with our ambition of translating engineered cells to medicines; seeking regulatory approval of our current and future product candidates; and increasing our workforce to support our expanded research and development operations. A change in the outcome of any of these factors could result in a significant change in the costs and timing associated with the development of our product candidates.

Research and development related success payments and contingent consideration

Research and development related success payments and contingent consideration include the change in the estimated fair value of our Cobalt and Harvard Success Payment liabilities and Cobalt Contingent Consideration liability. The expense or gain associated with our research and development related success payments and contingent consideration is unpredictable, in part, because our success payments are impacted by changes in our common stock price and market capitalization at the end of each reporting period, and may continue to vary significantly from quarter to quarter and year to year due to changes in the assumptions used in the calculations.

General and administrative

General and administrative expenses consist of personnel-related costs, including salaries, benefits, and non-cash stock-based compensation for our employees in finance, legal, executive, human resources, and information technology functions, legal and consulting fees, insurance fees, and facility costs not otherwise included in research and development expenses. Legal fees include those related to corporate and patent matters. Included in general and administrative expenses for the year ended December 31, 2023, are costs related to our strategic repositioning and associated workforce reduction in October 2023 and costs incurred for the early termination of the lease (Fremont lease) for our previously planned manufacturing facility in Fremont, California (Fremont facility). Included in general and administrative expenses for the year ended December 31, 2022, are costs related to our portfolio prioritization and corporate restructuring in November 2022 and the write-off of construction in progress costs incurred in connection with the Fremont facility.

As a result of our strategic repositioning and associated workforce reduction in October 2023, we anticipate that our general and administrative expenses will decrease in 2024, excluding potential one-time items, and likely increase over the longer term from the 2024 level to support potential expanded research and development activities.

Results of operations

Comparison of the years ended December 31, 2023 and 2022

The following table summarizes our results of operations for the periods presented:

	Year Ended December 31,		
	2023	2022	Change
	(in thousands)		
Operating expenses:			
Research and development	$ 268,823	$ 285,885	$ (17,062)
Research and development related success payments and contingent consideration	(48,981)	(84,882)	35,901
General and administrative	73,299	71,561	1,738
Total operating expenses	293,141	272,564	20,577
Loss from operations	(293,141)	(272,564)	(20,577)
Interest income, net	9,938	3,762	6,176
Other expense, net	(52)	(674)	622
Net loss	$ (283,255)	$ (269,476)	$ (13,779)

Research and development expenses

The following table summarizes the components of our research and development expenses for the periods presented:

	Year Ended December 31,		
	2023	2022	Change
	(in thousands)		
Research, development, and laboratory	60,330	70,585	(10,255)
Third-party manufacturing	20,907	27,986	(7,079)
Licensing of technology	1,095	6,873	(5,778)
Personnel	106,929	111,208	(4,279)
Impairment of lab equipment and leasehold improvements	7,014	-	7,014
Facility and other allocated costs	65,941	64,196	1,745
Other	6,607	5,037	1,570
Total research and development expense	$ 268,823	$ 285,885	$ (17,062)

Research and development expense was $268.8 million and $285.9 million for the years ended December 31, 2023 and 2022, respectively. The decrease of $17.1 million was primarily due to:

- a decrease of $10.3 million in research and laboratory costs, primarily due to our strategic repositioning in 2022 and 2023, partially offset by an increase in clinical development costs as more programs move into the clinic;
- a decrease of $7.1 million in third-party manufacturing costs for CDMOs, including pass-through costs for materials;
- a decrease of $5.8 million in costs to license technology for our CD22 and BCMA programs; and
- a decrease of $4.3 million in personnel-related costs, including $3.3 million in non-cash stock-based compensation expense.

These decreases were partially offset by $7.0 million for the impairment of certain lab equipment and leasehold improvements, primarily related to the strategic repositioning in October 2023.

Research and development related success payments and contingent consideration

The following table summarizes the gains associated with research and development related success payments and contingent consideration for the periods presented:

	Year Ended December 31,		
	2023	2022	Change
	(in thousands)		
Cobalt success payment	$ (7,856)	$ (69,337)	$ 61,481
Harvard success payments	(352)	(12,181)	11,829
Contingent consideration	(40,773)	(3,364)	(37,409)
Total research and development related success payments and contingent consideration	$ (48,981)	$ (84,882)	$ 35,901

The gains related to the change in the estimated fair value of our Cobalt Success Payment were $7.9 million and $69.3 million for the years ended December 31, 2023 and 2022, respectively. The changes in value were primarily due to changes in our market capitalization during the relevant periods, and for 2023, the reduction of our near-term investment in our fusogen program in connection with our strategic repositioning. The gains related to the change in the estimated fair value of our Harvard Success Payments were $0.3 million and $12.2 million for the years ended December 31, 2023 and 2022, respectively. The change in value were primarily due to changes in our common stock price during the relevant periods. The gains related to the change in the estimated fair value of our Cobalt Contingent Consideration were $40.8 million and $3.4 million for the years ended December 31, 2023 and 2022, respectively. The changes in value were due to the reduction of our near-term investment in our fusogen programs, including delaying the IND for SG299, which impacted the timing and probability of the achievement of milestones.

General and administrative expenses

General and administrative expenses were $73.3 million and $71.6 million for the years ended December 31, 2023 and 2022, respectively. The increase of $1.7 million was primarily due to an increase in patent and other legal fees of $4.3 million, a loss on lease termination of $2.7 million associated with the Fremont facility, and increased facility costs of $1.0 million. These increases were partially offset by the write-off of $4.5 million of construction in progress costs in 2022 for the Fremont facility and a decrease of $2.1 million in insurance costs.

Interest income, net

Interest income, net, was $9.9 million and $3.8 million for the years ended December 31, 2023 and 2022, respectively, and consisted primarily of interest earned on our cash and marketable securities balances.

Comparison of the years ended December 31, 2022 and 2021

The following table summarizes our results of operations for the periods presented:

	Year Ended December 31,		
	2022	2021	Change
	(in thousands)		
Operating expenses:			
Research and development	$ 285,885	$ 248,626	$ 37,259
Research and development related success payments and contingent consideration	(84,882)	57,873	(142,755)
General and administrative	71,561	50,410	21,151
Total operating expenses	272,564	356,909	(84,345)
Loss from operations	(272,564)	(356,909)	84,345
Interest income, net	3,762	676	3,086
Other income (expense)	(674)	305	(979)
Net loss	$ (269,476)	$ (355,928)	$ 86,452

Research and development expenses

The following table summarizes the components of our research and development expenses for the periods presented:

	Year Ended December 31,		
	2022	2021	Change
	(in thousands)		
Personnel	$ 111,208	$ 79,028	$ 32,180
Research and laboratory	70,585	54,017	16,568
Facility and other allocated costs	64,196	47,735	16,461
Third-party manufacturing	27,986	11,794	16,192
Licensing of technology	6,873	52,439	(45,566)
Other	5,037	3,613	1,424
Total research and development expense	$ 285,885	$ 248,626	$ 37,259

Research and development expenses were $285.9 million and $248.6 million for the years ended December 31, 2022 and 2021, respectively. The increase of $37.3 million was primarily due to:

- increased personnel-related expenses of $32.2 million, including an increase in non-cash stock-based compensation of $11.3 million, which was primarily attributable to an increase in headcount to expand our research and development capabilities;
- an increase of $16.6 million in research, development, and laboratory costs;
- an increase of $16.5 million primarily related to allocated personnel costs, depreciation expense, and facility and software costs; and
- an increase of $16.2 million in third-party manufacturing costs for CDMOs, including pass-through costs for materials.

These increases were offset by a decrease of $45.6 million in costs to license technology. Licensing costs in 2022 include an upfront payment of $6.0 million related to licensing technology for our CD22 and BCMA programs, and licensing costs in 2021 include an upfront payment of $50.0 million in 2021 related to licensing Beam's gene editing technology.

Research and development related success payments and contingent consideration

The following table summarizes the expenses (gains) associated with research and development related success payments and contingent consideration for the periods presented:

	Year Ended December 31,		
	2022	2021	Change
	(in thousands)		
Cobalt success payment	$ (69,337)	$ 23,659	$ (92,996)
Harvard success payments	(12,181)	2,372	(14,553)
Contingent consideration	(3,364)	31,842	(35,206)
Total research and development related success payments and contingent consideration	$ (84,882)	$ 57,873	$ (142,755)

The gain related to the change in the estimated fair value of our Cobalt Success Payment was $69.3 million for the year ended December 31, 2022, compared to an expense of $23.6 million for the same period in 2021. The change in value was due to the reduction in our market capitalization offset by progress toward filing an IND for SG299 during the relevant period. The gain related to the change in the estimated fair value of our Harvard Success Payments was $12.2 million for the year ended December 31, 2022, compared to an expense of $2.4 million for the same period in 2021. The changes in value were due to changes in our common stock price during the relevant period. The gain related to the change in the estimated fair value of our Cobalt Contingent Consideration was $3.4 million for the year ended December 31, 2022, compared to an expense of $31.8 million for the same period in 2021. The change in value was primarily due to variability of the discount rates used in the calculation offset by scientific progress toward the achievement of milestones during the relevant period.

General and administrative expenses

General and administrative expenses were $71.6 million and $50.4 million for the years ended December 31, 2022 and 2021, respectively. The increase of $21.2 million was primarily due to costs related to the November 2022 restructuring of $8.7 million, including non-cash stock-based compensation of $1.9 million, the write-off of $4.5 million of construction in progress costs incurred in connection with the Fremont facility, an increase in personnel-related costs of $4.0 million primarily attributable to an increase in headcount to build our infrastructure and support our continued research and development activities, operating costs related to the Fremont facility of $1.9 million, and increased facility costs of $1.0 million.

Interest income, net

Interest income, net, was $3.8 million and $0.7 million for the years ended December 31, 2022 and 2021, respectively, and consisted primarily of interest earned on our cash and marketable securities balances.

Liquidity, capital resources, and capital requirements

Sources of liquidity

As of December 31, 2023, we had $205.2 million in cash, cash equivalents, and marketable securities. To date we have raised an aggregate of approximately $1.5 billion in net proceeds from sales of common stock and private placements of our convertible preferred stock.

In February 2024, we completed an underwritten public offering pursuant to which we sold 21.8 million shares of our common stock, including 4.5 million shares pursuant to the full exercise of the underwriters' option to purchase additional shares, and pre-funded warrants to purchase 12.7 million shares of our common stock for net proceeds of approximately $179.9 million, after deducting underwriting discounts and commissions and estimated offering expenses.

In August 2022, we entered into a sales agreement with Cowen, acting as sales agent, pursuant to which we may offer and sell through Cowen, up to $150.0 million in shares of our common stock under the ATM facility. To date, we have sold an aggregate of 4.9 million shares of our common stock under the ATM facility for net proceeds of $28.7 million, after deducting commissions and expenses.

Since our inception, we have not generated any revenue from product sales or any other sources, and we have incurred significant operating losses. We have not yet commercialized any products, and we do not expect to generate revenue from sales of any product candidates for a number of years, if ever.

Future funding requirements

We expect to incur additional losses for the foreseeable future as we conduct and expand our research and development efforts, including conducting preclinical studies and clinical trials, developing new product candidates, establishing internal and external manufacturing capabilities, and funding our operations generally.

Based on our current operating plan, we believe that our existing cash, cash equivalents, and marketable securities will be sufficient to meet our working capital and capital expenditure needs for at least the next 12 months. However, we anticipate that we will need to raise additional financing in the future to fund our operations, including the commercialization of any approved product candidates. We are subject to the risks typically related to the development of new products, and we may encounter unforeseen expenses, difficulties, complications, delays, and other unknown factors that may adversely affect our business.

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

• the scope, timing, progress, costs, and results of discovery, preclinical development, and clinical trials for our current or future product candidates;

• the number and scope of clinical trials required for regulatory approval of our current or future product candidates;

• the costs, timing, and outcome of regulatory review of our current or future product candidates;

• the cost, timing, and scope of building our manufacturing capabilities, as well as costs associated with the manufacturing of clinical and commercial supplies of our current and future product candidates;

• the costs and timing of future commercialization activities, including manufacturing, marketing, sales, and distribution, for any of our product candidates for which we receive marketing approval;

• the costs and timing of preparing, filing, and prosecuting patent applications, maintaining and enforcing our intellectual property rights, and defending any intellectual property-related claims, including any claims by third parties that we are infringing upon their intellectual property rights;

• our ability to maintain existing, and establish new, strategic collaborations, licensing, or other arrangements, and the financial terms of any such agreements, including the timing and amount of any future milestone, royalty, or other payments due under any such agreement;

• the revenue, if any, received from commercial sales of our product candidates for which we receive marketing approval;

• the expenses required to attract, hire, and retain skilled personnel;

• the impact of global supply chain issues and rising rates of inflation on the costs of laboratory consumables, supplies, and equipment required for our ongoing operations;

• the costs of operating as a public company;

• our ability to establish a commercially viable pricing structure and obtain approval for coverage and adequate reimbursement from third-party, including government, payors;

• potential interruptions or delays resulting from global geo-political, economic, and other factors beyond our control;

• the effect of competing technological and market developments; and

• the extent to which we acquire or invest in businesses, products, and technologies.

Until such time, if ever, as we can generate significant revenue from product sales, we expect to finance our operations with our existing cash, cash equivalents, and marketable securities, proceeds from any future equity or debt financings, and upfront, milestone, and royalty payments received under any future licenses, collaborations, or other arrangements. In the event that additional financing is required, we may not be able to raise it on terms that are acceptable to us or at all. Our ability to raise additional financing may be adversely impacted by potential worsening global economic conditions and the recent disruptions to, and volatility in, the credit and financial markets in the United States and worldwide resulting from public health crises, conflicts in Ukraine, the Middle East, or other regions, changes in inflation, interest rate uncertainty, and other factors creating market risk. Recent bank failures have also caused increased concerns about liquidity in the broader financial services industry, and our business, business partners, or industry as a whole may be adversely impacted in ways that we cannot predict at this time. If we raise additional funds through the issuance of equity or convertible debt securities, existing stockholders' ownership interests will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our stockholders. Debt financing, if available, may result in increased fixed payment obligations, and the existence of securities with rights that may be senior to those of our common stock, and involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures, declaring dividends, or acquiring, selling, or licensing intellectual property rights or assets, which could adversely impact our ability to conduct our business. If we raise funds through strategic collaborations or licensing or other arrangements, we may have to relinquish significant rights or grant licenses on terms that are not favorable to us. Our ability to raise additional funds may be adversely impacted by potential worsening global economic conditions and the recent disruptions to, and volatility in, the credit and financial markets in the United States and worldwide resulting from various factors beyond our control. If we are unable to raise additional capital when desired, our business, results of operations, and financial condition would be adversely affected.

Cash flows

The following table summarizes our cash flows for the periods indicated:

	Year Ended December 31,		
	2023	2022	2021
	(in thousands)		
Net cash provided by (used in):			
Operating activities	$ (253,582)	$ (290,050)	$ (251,054)
Investing activities	172,012	210,562	(245,798)
Financing activities	31,646	4,913	631,751
Net increase (decrease) in cash, cash equivalents, and restricted cash	$ (49,924)	$ (74,575)	$ 134,899

Operating activities

During the year ended December 31, 2023, net cash used in operating activities was $253.6 million, consisting primarily of net loss of $283.3 million, the change in net operating assets and liabilities of $18.6 million, and non-cash charges of $11.1 million. The non-cash charges of $11.1 million consisted of gains of $40.8 million and $8.2 million for revaluation of our success payment liabilities and contingent consideration, respectively, non-cash stock-based compensation expense of $35.5 million, and depreciation expense of $24.6 million, which includes $7.0 million for the impairment of certain lab equipment and leasehold improvements which were primarily related to the strategic repositioning in October 2023.

During the year ended December 31, 2022, net cash used in operating activities was $290.1 million, consisting primarily of our net loss of $269.5 million, the change in net operating assets and liabilities of $7.5 million, and non-cash charges of $28.1 million. The non-cash charges of $28.1 million consisted of gains of $81.5 million and $3.4 million for revaluation of our success payment liabilities and contingent consideration, respectively, non-cash stock-based compensation expense of $38.3 million, depreciation expense of $15.6 million, and other non-cash charges of $2.9 million.

During the year ended December 31, 2021, net cash used in operating activities was $251.0 million, consisting primarily of our net loss of $355.9 million, partially offset by the change in our net operating assets and liabilities of $9.8 million and non-cash charges of $95.1 million. The non-cash charges of $95.1 million consisted of $31.8 million for revaluation of contingent consideration, $26.0 million for revaluation of our success payment liabilities, non-cash stock-based compensation expense of $22.4 million, depreciation expense of $11.1 million, and other non-cash charges of $3.8 million.

Investing activities

Cash provided by investing activities was $172.0 million during the year ended December 31, 2023, and cash used in investing activities was $210.6 million and $245.8 million during the years ended December 31, 2022 and 2021, respectively. For the year ended December 31, 2023, this consisted of net purchases and maturities of marketable securities of $192.0 million offset by the purchase of property and equipment of $20.0 million. For the years ended December 31, 2022 and 2021, this consisted of net purchases and maturities of marketable securities of $231.5 million and $211.3 million, respectively, and purchases of property and equipment of $20.9 million and $29.9 million, respectively.

Financing activities

During the year ended December 31, 2023, cash provided by financing activities was $31.6 million, consisting primarily of net proceeds from issuance of common stock under the ATM facility of $27.0 million and $4.6 million in proceeds from our employee stock purchase program and the exercise of stock options.

During the year ended December 31, 2022, cash provided by financing activities was $4.9 million, consisting primarily of proceeds from our employee stock purchase program and the exercise of stock options.

During the year ended December 31, 2021, cash provided by financing activities was $631.7 million, consisting primarily of net proceeds from our IPO of $626.4 million and $5.3 million in proceeds from our employee stock purchase plan and the exercise of stock options.

Contractual obligations and commitments

The following table summarizes our significant contractual obligations and commitments as of December 31, 2023:

	Payments Due by Period				
	Less than 1 Year	1 to 3 Years	3 to 5 Years	More than 5 Years	Total
			(in thousands)		
Operating lease obligations	$ 23,966	$ 47,865	$ 35,125	$ 93,495	$ 200,451

Other than as disclosed in the table above, the payment obligations under our license, collaboration, and acquisition agreements as of December 31, 2023 are contingent upon future events such as our achievement of specified development, regulatory, and commercial milestones or royalties on net product sales. See the section titled “Business—Key Intellectual Property Agreements” for more information about these payment obligations.

We are also obligated to make a success payment to Cobalt of up to $500.0 million, payable in cash or stock, pursuant to the terms and conditions in the Cobalt acquisition agreement, and up to an aggregate of $175.0 million in success payments to Harvard, payable in cash. See the subsection below titled “—Critical accounting policies and significant judgments and estimates—Success payments” and Note 3, Acquisitions, and Note 4, License and collaboration agreements, to our consolidated financial statements located elsewhere in this Annual Report for more information on the success payments. As of December 31, 2023, the timing and likelihood of achieving the milestones and success payments and generating future product sales are uncertain, and therefore any related payments are not included in the table above.

We also enter into agreements in the normal course of business for clinical trials, sponsored research, preclinical studies, contract manufacturing, and other services and products for operating purposes, which are generally cancelable upon written notice. These obligations and commitments are not included in the table above.

Off-balance sheet arrangements

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

JOBS Act accounting election

We are an "emerging growth company," as defined in the Jumpstart Our Business Startups Act of 2012 (the JOBS Act). We will remain an emerging growth company until the earliest to occur of (1) December 31, 2026, (2) the last day of the fiscal year in which we have total annual gross revenue of at least $1.235 billion, (3) the last day of the fiscal year in which we are deemed to be a "large accelerated filer" as defined in Rule 12b-2 under the Exchange Act, which would occur if the fair market value of our common stock held by non-affiliates exceeded $700.0 million as of the last business day of the second fiscal quarter of such year, or (4) the date on which we have issued more than $1.0 billion in non-convertible debt securities during the prior three-year period.

For so long as we remain an emerging growth company, we are permitted and intend to rely on certain exemptions from various public company reporting requirements, including not being required to have our independent registered public accounting firm provide an attestation report on our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and any golden parachute payments not previously approved.

In addition, under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards issued after the enactment of the JOBS Act until such time as those standards apply to private companies. We have elected to use the extended transition period for any new or revised accounting standards during the period in which we remain an emerging growth company; however, we may adopt certain new or revised accounting standards early if the standard allows early adoption.

Critical accounting policies and significant judgments and estimates

Our consolidated financial statements are prepared in accordance with generally accepted accounting principles in the United States. The preparation of these financial statements requires us to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. Our significant accounting policies are described in more detail in the notes to our consolidated financial statements included elsewhere in this Annual Report. We believe the following accounting policies relate to the significant areas involving management's judgments and estimates and are critical to understanding our historical and future performance.

Research and development expenses

We record research and development expenses in the periods in which they are incurred. We accrue for research and development expenses based on the estimated services performed, but not yet invoiced, pursuant to contracts with clinical research organizations, CDMOs, research institutions, or other service providers that conduct and manage clinical trials and preclinical studies, manufacture our product candidates, and perform other research services on our behalf and record these costs in accrued and other current liabilities. We make judgments and estimates in determining the accrued liabilities balance at each reporting period. Payments made prior to the receipt of goods or services to be used in research and development are recorded as prepaid expenses until the goods or services are received.

To date, we have not experienced any material differences between accrued expenses and actual expenses incurred. However, the status and timing of actual services performed may vary from our estimates, resulting in adjustments to expense in future periods. Changes in these estimates that result in material changes to our accruals could materially affect our results of operations.

Acquisitions

We account for business combinations using the acquisition method of accounting, which requires the assets acquired, including in-process research and development (IPR&D), and liabilities assumed, be recorded at their fair values as of the acquisition date. Any excess of the purchase price over the fair value of net assets acquired is recorded as goodwill. The determination of the estimated fair value of these items requires us to make significant estimates and assumptions.

If we determine the acquisition does not meet the definition of a business combination under the acquisition method of accounting, the transaction is accounted for as an asset acquisition and no goodwill or contingent consideration are recognized at the acquisition date. In an asset acquisition, upfront payments allocated to IPR&D are recorded in research and development expense if it is determined that there is no alternative future use, and subsequent milestone payments are recorded in research and development expense when achieved.

Intangible assets and goodwill

Accounting for business combinations requires us to make significant estimates and assumptions with respect to tangible and intangible assets acquired and liabilities assumed. We use our best estimates and assumptions to accurately assign fair value to the tangible and intangible assets acquired and liabilities assumed at the acquisition date as well as the useful lives of those acquired intangible assets. Intangible assets are reviewed for impairment annually and upon the occurrence of triggering events or substantive changes in circumstances that could indicate a potential impairment.

Goodwill represents the excess of the purchase price over the estimated fair value of the identifiable assets acquired and liabilities assumed in a business combination. We evaluate goodwill for impairment annually and upon the occurrence of triggering events or substantive changes in circumstances that could indicate a potential impairment. Our evaluation includes assessing qualitative factors or performing a quantitative analysis to determine whether it is more-likely-than-not that the fair value of net assets is below the carrying amounts.

Contingent consideration

Contingent consideration obligations are estimated at fair value at the acquisition date of a business combination and at each subsequent balance sheet date, with changes in fair value recorded in research and development related success payments and contingent consideration. The fair value of contingent consideration is determined by calculating the probability-weighted estimated value of the milestone payments based on the assessment of the likelihood and estimated timing that the milestones would be achieved and applying the relevant discount rates. We use significant estimates and assumptions in determining the estimated contingent consideration and associated expense or gain at each balance sheet date. The valuation of contingent consideration uses assumptions we believe would be made by a market participant. In evaluating the fair value of contingent consideration, significant judgment is required to estimate the likelihood and timing that the milestones would be achieved. We assess these estimates on an ongoing basis as additional data impacting the assumptions become available. Contingent consideration may change significantly as development progresses and additional data is obtained, impacting our assumptions regarding probabilities of successful achievement of the related milestones used to estimate the fair value of the liability and the timing in which they are expected to be achieved. Accordingly, the use of different market assumptions and/or different valuation techniques could result in materially different fair value estimates.

Success payments

The Cobalt Success Payment was recorded as a liability on the consolidated balance sheet at fair value on the acquisition date and is remeasured at each subsequent reporting period, with changes in fair value recognized in research and development related success payments and contingent consideration. For the Harvard Success Payments, both the initial value and subsequent changes in fair value are recorded in research and development related success payments and contingent consideration. To determine the estimated fair value of the success payment liabilities, we use a Monte Carlo simulation methodology which models the estimated fair value of the liability based on several key assumptions, including the estimated number and timing of valuation measurement dates on the basis of which payments may be triggered, term of the success payments, the risk-free interest rate, and expected volatility, which is estimated using peer company stocks for a period of time commensurate with the expected term assumption. Additionally, the computation of the estimated fair value of the Harvard Success Payments incorporates the per share fair market value of our common stock at the end of each reporting period, and the computation of the estimated fair value of the Cobalt Success Payment incorporates our market capitalization at the end of each reporting period. The assumptions used to calculate the fair value of the success payments are subject to a significant amount of judgment and a small change in the assumptions may have a relatively large change in the estimated liability and resulting expense or gain.

Stock-based compensation

We recognize compensation costs related to restricted stock awards, restricted stock units, and stock options granted to employees and non-employees based on the estimated fair value of the awards on the date of grant, and we recognize forfeitures as they occur. For restricted stock awards and restricted stock units, the fair value of our common stock is used to determine the resulting stock-based compensation expense. For stock options, we estimate the grant date fair value, and the resulting stock-based compensation expense, using the Black-Scholes option pricing model. The fair value of stock-based awards is recognized as an expense on a straight-line basis over the requisite service period, which is generally the vesting period.

The Black-Scholes option pricing model requires the use of highly subjective assumptions to determine the fair value of stock-based awards. These assumptions include:

- Fair Value of Common Stock—The fair value of our common stock is based on the closing price as reported on the Nasdaq Global Select Market on the date of grant.

• Expected Term—The expected term represents the period that the stock-based awards are expected to be outstanding. We use 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—Due to our limited operating history, the expected volatility is estimated based on the average historical volatilities of common stock of comparable publicly traded companies and our historical common stock volatility over a period of time commensurate with the expected term of the stock option grants. The comparable companies are chosen based on their size, stage in the product development cycle, or area of specialty. We will continue to apply this process until sufficient historical information regarding the volatility of our own stock price becomes available.

• Risk-Free Interest Rate—The risk-free interest rate is based on the U.S. Treasury yield in effect at the time of grant for zero-coupon U.S. Treasury notes with maturities approximately equal to the expected term of the awards.

• Expected Dividend—We have never paid dividends on our common stock and have no plans to pay dividends on our common stock. Therefore, we used an expected dividend yield of zero.

See Note 11, Stock-based compensation to our consolidated financial statements included elsewhere in this Annual Report for information concerning certain 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, 2023, 2022, and 2021. Such assumptions involve inherent uncertainties and the application of significant judgment. As a result, if factors or expected outcomes change or we use significantly different assumptions or estimates, our stock-based compensation could be materially different.

Recently adopted and recent accounting pronouncements

See Note 2, Summary of significant accounting policies to our consolidated financial statements included elsewhere in this Annual Report for information about recent accounting pronouncements, the timing of their adoption, and our assessment, to the extent we have made one, of their potential impact on our financial condition or results of operations.

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

We are exposed to market risks in the ordinary course of our business primarily related to interest rate sensitivities and the volatility of our common stock price.

Interest rate risk

As of December 31, 2023, we had cash, cash equivalents, and restricted cash of $137.3 million, which consisted of bank deposits and money market funds, and also had marketable securities of $71.7 million. The primary objective of our investment activities is to preserve capital to fund our operations while earning a low-risk return. Because our marketable securities are primarily short-term in duration, we believe that our exposure to interest rate risk is not significant, and a hypothetical 10% change in market interest rates during any of the periods presented would not have had a significant impact on the total value of our portfolio. We had no debt outstanding as of December 31, 2023.

Market capitalization and common stock price sensitivity

We agreed to make a success payment to Cobalt based on our market capitalization payable in cash or stock, and success payments to Harvard based on increases in the per share fair market value of our common stock, payable in cash.

As of December 31, 2023, the estimated aggregate fair value of the success payment liabilities was $12.8 million. For the twelve months ended December 31, 2023, we recorded a gain of $8.2 million related to the aggregate change in the estimated fair value of our success payment liabilities.

Changes in our market capitalization and the fair value of our common stock as of each balance date may have a relatively large change in the estimated valuation of the success payment liabilities and resulting expense or gain. For example, for the Cobalt Success Payment, keeping all other variables constant, a hypothetical 20% increase in our market capitalization as of December 31, 2023 from $0.8 billion to $1.0 billion would have decreased the gain recorded in the year ended December 31, 2023 by $2.9 million to $5.0 million. A hypothetical 20% decrease in our market capitalization from $0.8 billion to $0.6 billion would have increased the gain recorded in the year ended December 31, 2023 by $2.6 million to $10.5 million. For the Harvard Success Payments, keeping all other variables constant, a hypothetical 20% increase in our common stock price as of December 31, 2023 from $4.08 per share to $4.90 per share would have decreased the gain recorded in the year ended December 31, 2023 by $0.6 million, resulting in a $0.2 million expense. A hypothetical 20% decrease in the common stock price from $4.08 per share to $3.26 per share would have increased the gain recorded in the year ended December 31, 2023 by $0.5 million to $0.9 million.

Foreign currency sensitivity

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

Effects of inflation

Inflation generally affects us by increasing our cost of labor and laboratory consumables. We believe that inflation has not had a material effect on our financial statements.

Item 8. Financial Statements and Supplementary Data.

SANA BIOTECHNOLOGY, INC.
INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Sana Biotechnology, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Sana Biotechnology Inc. (the Company) as of December 31, 2023 and 2022, the related consolidated statements of operations, comprehensive loss, convertible preferred stock and stockholders' equity (deficit) and cash flows for each of the three years in the period ended December 31, 2023, 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, 2023 and 2022, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2023, 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 2018.

Seattle, Washington
February 29, 2024

Sana Biotechnology, Inc.
Consolidated Balance Sheets
(in thousands, except per share amounts)

	December 31, 2023 (unaudited)	December 31, 2022
ASSETS		
Current assets:		
Cash and cash equivalents	$ 133,517	$ 176,765
Marketable securities	71,678	247,198
Restricted cash	3,832	6,100
Prepaid expenses and other current assets	4,488	14,374
Total current assets	213,515	444,437
Long-term marketable securities	-	10,051
Property and equipment, net	70,689	66,917
Operating lease right-of-use assets	74,903	92,486
Long-term restricted cash	-	4,408
Intangible asset	59,195	59,195
Goodwill	140,627	140,627
Other non-current assets	6,370	4,599
TOTAL ASSETS	$ 565,299	$ 822,720
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 4,108	$ 2,857
Accrued compensation	23,722	26,362
Accrued expenses and other current liabilities	23,462	14,547
Operating lease liabilities	13,195	12,393

Contingent consideration		
	-	55,345
Total current liabilities	64,487	111,504
Operating lease liabilities, net of current portion	90,901	95,860
Contingent consideration, net of current portion	109,606	95,034
Success payment liabilities	12,799	21,007
Total liabilities	277,793	323,405
Commitments and contingencies (Note 9)		
Stockholders' equity:		
Preferred stock, $ 0.0001 par value; 50,000 shares authorized; zero shares issued and outstanding as of December 31, 2023 and December 31, 2022	-	-
Common stock, $ 0.0001 par value; 750,000 shares authorized; 197,857 and 191,022 shares issued and outstanding as of December 31, 2023 and December 31, 2022, respectively	20	19
Additional paid-in capital	1,625,637	1,558,459
Accumulated other comprehensive loss	(60)	(4,327)
Accumulated deficit	(1,338,091)	(1,054,836)
Total stockholders' equity	287,506	499,315

TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$ 565,299	$ 822,720

See accompanying notes.

Sana Biotechnology, Inc.
Consolidated Statements of Operations
(in thousands, except per share amounts)

	Year Ended December 31,		
	2023	2022	2021
Operating expenses:			
Research and development	$ 268,823	$ 285,885	$ 248,626
Research and development related success payments and contingent consideration	(48,981)	(84,882)	57,873
General and administrative	73,299	71,561	50,410
Total operating expenses	293,141	272,564	356,909
Loss from operations	(293,141)	(272,564)	(356,909)
Interest income, net	9,938	3,762	676
Other income (expense), net	(52)	(674)	305
Net loss	$ (283,255)	$ (269,476)	$ (355,928)
Net loss per common share – basic and diluted	$ (1.46)	$ (1.43)	$ (2.14)
Weighted-average number of common shares – basic and diluted	194,541	188,344	166,433

See accompanying notes.

Sana Biotechnology, Inc.
Consolidated Statements of Comprehensive Loss
(in thousands)

	Year Ended December 31,		
	2023	2022	2021
Net loss	$ (283,255)	$ (269,476)	$ (355,928)
Other comprehensive income (loss), net of tax:			
Unrealized gain (loss) on marketable securities, net	4,267	(2,961)	(1,396)
Total comprehensive loss	$ (278,988)	$ (272,437)	$ (357,324)

See accompanying notes.

Sana Biotechnology, Inc.
Consolidated Statements of Convertible Preferred Stock and Stockholders' Equity (Deficit)
(in thousands)

	Convertible Preferred Stock		Common Stock		Additional Paid-In	Accumulated Other Comprehensive	Accumulated	Total Stockholders'
	Shares	Amount	Shares	Amount	Capital	Income (Loss)	Deficit	Equity (Deficit)
Balance as of December 31, 2020	134,113	$ 852,897	16,170	$ 2	$ 8,216	$ 30	$ (429,432)	$ (421,184)
Conversion of convertible preferred stock into common stock upon initial public offering	(134,113)	(852,897)	134,113	13	852,884	-	-	852,897
Issuance of common stock in initial public offering, net of $49,220 in offering costs	-	-	27,025	3	626,402	-	-	626,405
Vesting of restricted stock	-	-	5,916	-	-	-	-	-
Exercise of stock options	-	-	1,586	-	3,167	-	-	3,167
Issuance of common stock related to employee stock purchase plan	-	-	119	-	2,179	-	-	2,179
Stock-based compensation	-	-	-	-	22,362	-	-	22,362
Unrealized loss on marketable securities, net	-	-	-	-	-	(1,396)	-	(1,396)
Net loss	-	-	-	-	-	-	(355,928)	(355,928)
Balance as of December 31, 2021	-	$ -	184,929	$ 18	$ 1,515,210	$ (1,366)	$ (785,360)	$ 728,502
Issuance of common stock from at the market offering, net of issuance costs of $625	-	-	149	-	601	-	-	601
Vesting of restricted stock	-	-	4,395	1	-	-	-	1
Exercise of stock options	-	-	1,062	-	2,253	-	-	2,253
Issuance of common stock related to employee stock purchase plan	-	-	487	-	2,058	-	-	2,058
Stock-based compensation	-	-	-	-	38,337	-	-	38,337

Unrealized loss on marketable securities, net	-	-	-	-	-	(2,961)	-	(2,961)
Net loss	-	-	-	-	-	-	(269,476)	(269,476)
Balance as of December 31, 2022	-	$ -	191,022	$ 19	$ 1,558,459	$ (4,327)	$ (1,054,836)	$ 499,315
Issuance of common stock from at the market offering, net of issuance costs of $ 1,213	-	-	4,586	1	27,019	-	-	27,020
Vesting of restricted stock	-	-	443	-	-	-	-	-
Exercise of stock options	-	-	1,146	-	2,020	-	-	2,020
Issuance of common stock related to employee stock purchase plan	-	-	660	-	2,606	-	-	2,606
Stock-based compensation	-	-	-	-	35,533	-	-	35,533
Unrealized gain on marketable securities, net	-	-	-	-	-	4,267	-	4,267
Net loss	-	-	-	-	-	-	(283,255)	(283,255)
Balance as of December 31, 2023	-	$ -	197,857	$ 20	$ 1,625,637	$ (60)	$ (1,338,091)	$ 287,506

See accompanying notes.

Sana Biotechnology, Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Year Ended December 31,		
	2023	2022	2021
OPERATING ACTIVITIES:			
Net loss	$ (283,255)	$ (269,476)	$ (355,928)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and impairment of long-lived assets	24,557	15,625	11,070
Stock-based compensation expense	35,533	38,337	22,362
Change in the estimated fair value of contingent consideration	(40,773)	(3,364)	31,842
Change in the estimated fair value of success payment liabilities	(8,208)	(81,518)	26,031
Non-cash expense for operating lease right-of-use assets	13,265	12,106	6,844
Other non-cash items, net	(13,312)	(9,302)	(3,076)
Changes in operating assets and liabilities:			
Prepaid expenses and other assets	8,143	(5,988)	(861)
Operating lease right-of-use assets and liabilities	10,959	1,562	5,088
Accounts payable	1,027	1,058	(266)
Accrued expenses and other liabilities	(1,518)	10,910	5,840
Net cash used in operating activities	(253,582)	(290,050)	(251,054)
INVESTING ACTIVITIES:			
Purchases of marketable securities	(157,744)	(78,688)	(491,387)
Proceeds from maturities of marketable securities	349,788	310,126	280,025
Purchases of property and equipment	(20,032)	(20,876)	(29,862)

Other investing activities	-	-	(4,574)
Net cash provided by (used in) investing activities	172,012	210,562	(245,798)
FINANCING ACTIVITIES:			
Proceeds from initial public offering, net of issuance costs	-	-	626,405
Proceeds from issuance of common stock, net	4,626	4,312	5,346
Proceeds from issuance of common stock under at the market offering	27,020	601	-
Net cash provided by financing activities	31,646	4,913	631,751
Net increase (decrease) in cash, cash equivalents, and restricted cash	(49,924)	(74,575)	134,899
Cash, cash equivalents, and restricted cash at beginning of period	187,273	261,848	126,949
Cash, cash equivalents, and restricted cash at end of period	$ 137,349	$ 187,273	$ 261,848
RECONCILIATION OF CASH, CASH EQUIVALENTS AND RESTRICTED CASH:			
Cash and cash equivalents	$ 133,517	$ 176,765	$ 253,029
Restricted cash	3,832	6,100	-
Long-term restricted cash	-	4,408	8,819
Total cash, cash equivalents, and restricted cash	$ 137,349	$ 187,273	$ 261,848
SUPPLEMENTAL CASH FLOW INFORMATION:			
Operating lease right-of-use assets obtained in exchange for lease obligations	$ 8,984	$ 21,073	$ 39,996
Purchases of property and equipment included in accounts payable and accrued liabilities	$ 9,471	$ 1,234	$ 3,015
Cash received for tenant improvement allowances	$ 12,547	$ 2,014	$ 5,445
Remeasurement of operating lease right-of-use asset for lease modification	$ -	$ (12,801)	$ -

Derecognition of operating lease right-of-use asset for lease termination	(14,204)	$ -	$ -

See accompanying notes.

Sana Biotechnology, Inc.
Notes to Consolidated Financial Statements

1. Organization

Sana Biotechnology, Inc. (the Company or Sana) is a biotechnology company focusing on utilizing engineered cells as medicines. The Company's operations to date have included identifying and developing potential product candidates, executing preclinical studies, establishing manufacturing capabilities, preparing for and executing clinical trials of its product candidates and supporting clinical trials of product candidates developed using its technologies, acquiring technology, organizing and staffing the Company, business planning, establishing and maintaining the Company's intellectual property portfolio, raising capital, and providing general and administrative support for these operations.

Liquidity and capital resources

The Company is subject to a number of risks and uncertainties similar to other biotechnology companies in the development stage, including, but not limited to, those related to the need to obtain adequate additional funding, possible failure of preclinical testing or clinical trials, the need to obtain marketing approval for its product candidates, building out internal and external manufacturing capabilities, competitors developing new technological innovations, the need to successfully commercialize and gain market acceptance of the Company's products, the need to protect the Company's intellectual property and proprietary technologies, and the need to attract and retain key scientific and management personnel. If the Company does not successfully commercialize or partner any of its product candidates, it will be unable to generate product revenue or achieve profitability. Until such time as the Company can generate significant revenue from product sales, if ever, it expects to finance its operations with the proceeds from additional equity or debt financings or capital obtained in connection with strategic collaborations or licensing or other arrangements. In the event that additional financing is required, the Company may not be able to raise it on terms acceptable to it or at all.

In February 2024, the Company completed an underwritten public offering pursuant to which it sold

21.8
million shares of its common stock, including

4.5
million shares pursuant to the full exercise of the underwriters' option to purchase additional shares, and pre-funded warrants to purchase

12.7
million shares of its common stock for net proceeds of approximately $

179.9
million, after deducting underwriting discounts and commissions and estimated offering expenses.

In August 2022, the Company entered into a sales agreement with Cowen and Company, LLC (Cowen), acting as sales agent, pursuant to which it may offer and sell through Cowen up to $

150.0
million in shares of the Company's common stock from time to time in a series of one or more at the market equity offerings (collectively, the ATM facility). As of December 31, 2023, the Company sold an aggregate of

4.7
million shares of the Company's common stock under the ATM facility for net proceeds of $

27.6
million in net proceeds, after deducting commissions and expenses.

In February 2021, the Company completed its initial public offering (IPO) and issued

27.0
million shares of its common stock, including

3.5
million shares pursuant to the full exercise of the underwriters' option to purchase additional shares, and received $

626.4
million in net proceeds, after deducting underwriting discounts and commissions and offering expenses.

In October 2023, the Company announced a strategic repositioning and associated workforce reduction to increase its focus on its *ex vivo* cell therapy product candidates. In addition to an increased focus on its *ex vivo* programs, the Company reduced its near-term investment in its fusogen platform for *in vivo* gene delivery, including the delay of the investigational new drug application (IND) submission for its SG299 program, and reduced its workforce by approximately

29
%. The strategic repositioning and associated workforce reduction was substantially completed in 2023. During the year ended December 31, 2023, the Company recognized $

5.2
million of cash-based expenses in general and administrative expense related to employee severance, benefits, and related costs for employees impacted by the reduction in force.

The Company has incurred operating losses each year since inception and expects such losses to continue for the foreseeable future. As of December 31, 2023, the Company had cash, cash equivalents, and marketable securities of $

205.2
million, and an accumulated deficit of $

1.3
billion, which includes non-cash charges related to the revaluation of the success payment liabilities and contingent consideration of $

10.3
million and $

58.3
million, respectively.

2. Summary of significant accounting policies

Basis of presentation

The accompanying consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries, and have been prepared in accordance with generally accepted accounting principles in the United States (GAAP). Certain prior period amounts have been reclassified to conform to current period presentation.

Use of estimates

The preparation of the financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. The Company evaluates its estimates and assumptions on an ongoing basis using historical experience and other factors and adjusts those estimates and assumptions when facts and circumstances dictate. Actual results could materially differ from those estimates. The most significant estimates in the Company's consolidated financial statements relate to success payment liabilities, contingent consideration, business combinations, accrued expenses, and operating lease right-of-use (ROU) assets and liabilities.

Cash and cash equivalents

Cash and cash equivalents include cash and highly liquid investments with original maturities of three months or less at acquisition. Cash equivalents include investments in money market funds with commercial banks and financial institutions and are stated at fair value.

Marketable securities

Marketable securities are classified as available-for-sale debt securities and are carried at fair value, which is derived from independent pricing sources based on quoted prices in active markets for similar securities. Investments in securities with maturities of less than one year, or those for which management intends to use to fund current operations, are included in current assets. Unrealized gains and losses that are deemed to be temporary in nature are reported as a component of accumulated comprehensive income (loss). Amortization, accretion, and dividends are included in interest income, net on the consolidated statement of operations. The cost of securities sold is based on the specific-identification method. Each reporting period, the Company evaluates whether declines in fair value below carrying value are due to expected credit losses, as well as the Company's ability and intent to hold the investment until a forecasted recovery occurs. Expected credit losses are recorded as an allowance through other income (expense), net.

Concentrations of credit risk and off-balance sheet risk

The Company maintains its cash, cash equivalents, and marketable securities with high quality, accredited financial institutions. These amounts, at times, may exceed federally insured limits. The Company has not experienced any credit losses in such accounts and does not believe it is exposed to significant risk on these funds. The Company has no off-balance sheet concentrations of credit risk, such as foreign currency exchange contracts, option contracts, or other hedging arrangements.

Fair value measurement

The Company accounts for certain assets and liabilities at fair value and is required to disclose information that enables an assessment of the inputs used in determining the reported fair values. The fair value hierarchy prioritizes valuation inputs based on the observable nature of those inputs. The hierarchy applies only to the valuation inputs used to determine the reported fair value of the investments and is not a measure of the investment credit quality. The hierarchy defines three levels of valuation inputs:

Level 1 – Quoted prices in active markets for identical assets or liabilities.

Level 2 – Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.

Level 3 – Unobservable inputs that reflect the Company's own assumptions about the assumptions market participants would use in pricing the asset or liability.

The Company's financial instruments include cash and cash equivalents, short- and long-term marketable securities, accounts payable, contingent consideration, success payment liabilities, and other accrued liabilities. The carrying amounts of cash, cash equivalents, accounts payable, and accrued liabilities approximate fair value due to the short-term nature of these instruments. To the extent the valuation of financial instruments 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. See Note 6, Fair value measurements for more information on how the Company determines fair value.

Property and equipment, net

Property and equipment are stated at cost, net of accumulated depreciation. Depreciation of property and equipment is computed using the straight-line method over the estimated useful lives of the respective assets, generally three to five years . Leasehold improvements are depreciated over the lesser of their useful lives or the remaining life of the lease. When assets are retired or otherwise disposed of, the cost and related accumulated depreciation are removed from the balance sheet and the resulting gain or loss is recorded in research and development expenses in the period realized. The Company recognized $

7.0

million in research and development expenses for the impairment of certain lab equipment and leasehold improvement as a result of the strategic repositioning in October 2023. Repairs and maintenance are expensed as incurred.

Impairment of long-lived assets

The Company reviews the carrying value and estimated lives of its long-lived assets whenever events or circumstances indicate the carrying values may not be recoverable. Should an impairment exist, the impairment loss would be measured based on the excess of the asset's carrying amount over its fair value.

Acquisitions

The Company accounts for business combinations using the acquisition method of accounting, which requires the assets acquired, including in-process research and development (IPR&D), and liabilities assumed be recorded at fair value as of the acquisition date. Any excess of the purchase price over the fair value of net assets acquired is recorded as goodwill. The determination of the estimated fair value of these items requires significant estimates and assumptions. Transaction costs associated with business combinations are recorded in general and administrative expense as they are incurred.

If the Company determines the acquisition does not meet the definition of a business combination under the acquisition method of accounting, the transaction is accounted for as an asset acquisition. In an asset acquisition, up-front payments allocated to IPR&D are recorded in research and development expense if it is determined that there is no alternative future use, and subsequent milestone payments are recorded in research and development expense when achieved.

Goodwill and intangible assets

Goodwill represents the excess of the purchase price over the estimated fair value of the identifiable assets acquired and liabilities assumed in a business combination. The Company evaluates goodwill for impairment annually or when a triggering event occurs that could indicate a potential impairment. The evaluation for impairment includes assessing qualitative factors or performing a quantitative analysis to determine whether it is more-likely-than-not that the fair value of net assets is below the carrying amount. As of December 31, 2023, the Company had goodwill of $

140.6

million related to its acquisition of Cobalt Biomedicine, Inc. (Cobalt) in 2019 (the Cobalt acquisition), which represents the excess of the purchase price over the estimated fair value of the net assets acquired. There have been

no

impairments of goodwill since the acquisition.

Intangible assets acquired in a business combination are recognized separately from goodwill and are initially recognized at fair value at the acquisition date. The fair value of the IPR&D is estimated using the replacement cost method. Under this method, the Company estimates the cost to recreate the technology and derive an estimated value to develop the technology. IPR&D assets are required to be classified as indefinite-lived assets and are not amortized until they become finite-lived assets upon the successful completion of the associated research and development technology. At that time, the useful life of the asset will be determined, and amortization will begin. If the associated research and development technology is abandoned, the related IPR&D asset will be written off and an impairment charge recorded. Intangible assets are reviewed for impairment at least annually or when a triggering event occurs that could indicate a potential impairment. There has been

no

amortization or impairment of the intangible asset since the Cobalt acquisition.

Contingent consideration from business combinations

Contingent consideration from a business combination is recorded at fair value on the acquisition date and remeasured at each subsequent reporting period with changes in fair value recognized in research and development related success payments and contingent consideration. Changes in fair values reflect changes to the Company's assumptions regarding probabilities of successful achievement of related milestones, the timing in which the milestones are expected to be achieved, and the discount rate used to estimate the fair value of the obligation.

Pursuant to the terms and conditions of the Cobalt acquisition agreement, we are obligated to pay to certain former Cobalt stockholders contingent consideration (Cobalt Contingent Consideration). See Note 3, Acquisitions for more details on the Cobalt Consideration.

Success payments

The Company agreed to pay success payments to Cobalt (Cobalt Success Payment) pursuant to the terms of its acquisition agreement with Cobalt and to the President and Fellows of Harvard College (Harvard) (Harvard Success Payments) pursuant to the terms of its exclusive license agreement with Harvard. See Note 3, Acquisitions and Note 4, License and collaboration agreements for more details on the success payments.

The success payments are accounted for under Accounting Standards Codification (ASC) 815, *Derivatives and Hedging*. The Cobalt Success Payment was recorded as a liability on the consolidated balance sheet at fair value on the acquisition date and is remeasured at each subsequent reporting period, with changes in fair value recognized in research and development related success payments and contingent consideration. For the Harvard Success Payments, both the initial value and subsequent changes in fair value are recorded in research and development related success payments and contingent consideration.

To determine the estimated fair value of the success payment liabilities, the Company uses a Monte Carlo simulation methodology, which models the value of the liabilities based on several key assumptions, including the remaining terms of the success payments, risk-free interest rate, estimated number and timing of valuation measurement dates on the basis of which payments may be triggered, and expected volatility of the Company's common stock. Expected volatility is estimated using the volatility of peer companies for a period of time commensurate with the remaining terms of the success payments. Additionally, the computation of the estimated fair value of the Cobalt Success Payment liability incorporates the market capitalization of the Company at the end of each reporting period, and the computation of the estimated fair value of the Harvard Success Payments incorporates the per share fair market value of the Company's common stock at the end of each reporting period.

Leases

At the inception of an arrangement with a third party, the Company determines whether the arrangement is or contains a lease based on the unique facts and circumstances present in the arrangement. Lease liabilities represent an obligation to make payments arising from a lease and are measured at the present value of the remaining future lease payments over the term of the lease. The present value of the lease payments is determined using an incremental borrowing rate (IBR), which reflects the fixed rate at which the Company could borrow the amount of the lease payments, on a collateralized basis, for a similar term and economic environment. The lease terms may include the impact of options to extend or terminate the lease when it is reasonably certain that the Company will exercise the option. Assumptions made by the Company at the lease commencement date are re-evaluated upon the occurrence of certain events, including a lease modification. When a lease modification results in a separate contract, it is accounted for in the same manner as a new lease. ROU assets represent the right to use the underlying asset identified in the lease for the term of the agreement. The calculation of the ROU asset incorporates the value of the lease liability and excludes any lease incentives received and initial direct costs incurred.

The Company's lease portfolio consists of operating leases related to its facilities for office, laboratory, and manufacturing space. The Company does not have any financing leases. Leases with a term of 12 months or less are considered short-term and do not require recognition on the balance sheet, and payments associated with short-term leases are expensed as incurred. Rent expense for operating leases is recognized on a straight-line basis over the lease term.

Claims and contingencies

From time to time, the Company may become involved in litigation and proceedings relating to claims arising in the ordinary course of business. The Company accrues a liability if the likelihood of an adverse outcome is probable, and the amount can be reasonably estimated. If the likelihood of an adverse outcome is only reasonably possible, or if an adverse outcome is probable, but an estimate is not determinable, the Company provides disclosure of the material claim or contingency.

Stock-based compensation

The Company recognizes compensation costs related to restricted stock awards (RSAs), restricted stock units (RSUs), and stock options granted to employees and nonemployees based on the estimated fair value of the awards on the date of grant and recognizes expense on a straight-line basis over the requisite service period, which is generally the vesting period of the award. Forfeitures are recognized as they occur. For RSAs and RSUs, the fair value of the Company's common stock is used to determine the resulting stock-based compensation expense. The fair value of stock options is estimated on the date of grant using a Black-Scholes option pricing model which requires management to apply judgment and make estimates, including:

• *Fair Value of Common Stock*—The fair value of common stock is based on the closing price as reported on The Nasdaq Global Select Market on the date of grant.

• *Expected Term*—The expected term represents the period that a stock-based award is 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 option.

• *Expected Volatility*—Due to the Company's limited operating history, the expected volatility is estimated based on the average historical volatilities of common stock of comparable publicly traded companies and the Company's historical common stock volatility over a period of time commensurate with the expected term of the stock option grants. The comparable companies are chosen based on their size, stage in the product development cycle, or area of specialty. The Company will continue to apply this process until sufficient 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 yield in effect at the time of grant for zero-coupon U.S. Treasury notes with maturities approximately equal to the expected term of the awards.

• *Expected Dividend*—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

.

Research and development expense

The Company records expense for research and development costs as incurred. Nonrefundable, advance payments for goods or contracts for services are deferred, and expense is recognized in the period in which the goods are received or the services are rendered. Research and development expense consists of personnel-related costs, including salaries, benefits, and non-cash stock-based compensation, external research and development expenses incurred under arrangements with third parties, including CDMO manufacturing costs (including pass-through costs), clinical trial costs, costs for laboratory supplies, costs to acquire and license technologies aligned with the Company's goal of translating engineered cells to medicines, facility expenses, including rent and depreciation, and other allocated expenses.

Research and development related success payments and contingent consideration

Research and development related success payments and contingent consideration include the change in the estimated fair value of the Cobalt Success Payment and Harvard Success Payment liabilities and Cobalt Contingent Consideration. Research and development expense related to the success payment liabilities and contingent consideration is unpredictable and may vary significantly from quarter-to-quarter and year-to-year due to changes in the assumptions used in the calculations.

General and administrative expenses

General and administrative expenses consist of personnel costs, including salaries, benefits, and non-cash stock-based compensation, for employees in finance, legal, executive, human resources, information technology, and other administrative functions, legal and consulting fees, recruiting costs, and facility costs not otherwise included in research and development expenses. Legal fees include those related to corporate and patent matters. Included in general and administrative expenses for the year ended December 31, 2023, are costs related to the October 2023 strategic repositioning and costs incurred for the early termination of the Company's lease (Fremont lease) for its previously planned manufacturing facility in Fremont, California (Fremont facility). Included in general and administrative expenses for the year ended December 31, 2022 were costs related to the November 2022 restructuring and the write-off of construction in progress costs incurred in connection with the Fremont facility.

Income taxes

The Company determines its deferred tax assets and liabilities based on the differences between the financial statement and tax bases of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. A valuation allowance is recorded when it is more likely than not that the deferred tax asset will not be recovered. The Company applies judgment in the determination of the financial statement recognition and measurement of a tax position taken or expected to be taken in a tax return. The Company recognizes any material interest and penalties related to unrecognized tax benefits in income tax expense.

The Company is required to file income tax returns in the United States (U.S.) federal jurisdiction, and other state and local jurisdictions. The Company is generally subject to examination by U.S. federal and local income tax authorities for all tax years in which the loss carryforward is available. The Company is currently not under examination by the Internal Revenue Service or other jurisdictions for any tax years.

Segments

Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision-maker in making decisions regarding resource allocation and assessing performance. The Company views its operations and manages its business in

one
operating segment.

JOBS Act accounting election

The Company is an emerging growth company (EGC), as defined in the Jumpstart Our Business Startups Act of 2012 (JOBS Act). Under the JOBS Act, an EGC can delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act until such time as those standards apply to private companies. The Company has elected to use this extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies; however, the Company may adopt new or revised accounting standards early if the standard allows for early adoption.

In addition, the Company will utilize other exemptions and reduced reporting requirements provided to EGCs by the JOBS Act. Subject to certain conditions set forth in the JOBS Act, an EGC is not required to, among other things, (i) provide an auditor’s attestation report on the company’s system of internal controls over financial reporting pursuant to Section 404(b) of the Sarbanes-Oxley Act of 2002, (ii) provide all of the compensation disclosure that may be required of non-EGC public companies under the Dodd-Frank Wall Street Reform and Consumer Protection Act, (iii) 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 (auditor discussion and analysis), or (iv) disclose certain executive compensation-related items, such as the correlation between executive compensation and performance and comparisons of the chief executive officer’s compensation to median employee compensation.

Recent accounting pronouncements

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board (FASB) or other standard-setting bodies that the Company adopts as of the specified effective date. Unless otherwise discussed, the Company does not believe that the adoption of any recently issued standards has had or may have a material impact on its condensed consolidated financial statements or disclosures.

In December 2023, the FASB issued ASU 2023-09 Income Taxes (Topic 740) Improvements to Income Tax Disclosures that requires disclosure of disaggregated income taxes paid, prescribes standard categories for the components of the effective tax rate reconciliation, and modifies other income tax-related disclosures. This ASU is effective for the Company's fiscal year 2025. Early adoption is permitted. The Company is currently evaluating income tax disclosures related to its annual report for fiscal year 2025.

3. Acquisitions

Cobalt Biomedicine, Inc.

In February 2019, the Company acquired

100
% of the outstanding equity of Cobalt, a privately-held early-stage biotechnology company developing a platform technology using its fusogen technology to specifically and consistently deliver various biological payloads to cells (the Cobalt acquisition).

As part of the Cobalt acquisition, the Company recorded an intangible asset of $

59.2
million, which consists of IPR&D that is classified as indefinite-lived until the successful completion of the associated research and development technology, at which point it becomes a finite-lived asset and will be amortized over its estimated useful life. If the research and development technology is abandoned, an impairment charge will be recorded. The Company is actively developing the fusogen technology and, accordingly, the intangible asset is not complete. Amortization will begin when regulatory approval of a product candidate developed using the fusogen technology is obtained in a major market, typically either the United States or the European Union.

The Company recognized $

140.6
million of goodwill as a result of the Cobalt acquisition, which is primarily attributable to the value the acquisition provides the Company by complementing the Company's *ex vivo* portfolio with *in vivo* fusogen cell engineering technology and furthering the Company's research in using engineered cells as medicines. The goodwill is not deductible for income tax purposes. There were

no
impairments of the intangible asset or goodwill since the acquisition.

Pursuant to the terms and conditions in the Cobalt acquisition agreement, the Company has an obligation to pay to certain former Cobalt stockholders contingent consideration (Cobalt Contingent Consideration) of up to an aggregate of $

500.0
million upon the achievement of certain specified development milestones and a success payment (Cobalt Success Payment) of up to $

500.0
million, each of which is payable in cash or stock. The Cobalt Success Payment is payable if, at pre-determined valuation measurement dates, the Company's market capitalization equals or exceeds $

8.1
billion, and the Company is advancing a program based on the fusogen technology in a clinical trial pursuant to an investigational new drug application, or has filed, or received approval for, a biologics license application or new drug application for a product developed using the fusogen technology. The Cobalt Success Payment can be achieved over a maximum of 20 years from the date of the acquisition, but this period could be shorter upon the occurrence of certain events. A valuation measurement date would also be triggered upon a change of control of the Company if at least one of the Company's programs based on the fusogen technology is an active research program at the time of such change of control. If the Company's market capitalization is below $

8.1
billion as of the date of a change of control, the amount of the potential Cobalt Success Payment will decrease, and the amount of potential Cobalt Contingent Consideration will increase. As of December 31, 2023, a Cobalt Success Payment had not been triggered.

The following table sets forth various thresholds for the Company's market capitalizations as of the date of a change of control and the resulting potential Cobalt Success Payment and additional potential Cobalt Contingent Consideration:

Sana market capitalization upon a change of control and resulting impact to Cobalt Success Payment and additional potential Cobalt Contingent Consideration	**Cobalt Success Payment**	**Additional potential Cobalt Contingent Consideration**
	(in millions)	
Equal to or exceeds $ 8.1 billion	$ 500	$ -
Equal to or exceeds $ 7.4 billion, but less than $8.1 billion	150	350
Equal to or exceeds $ 6.8 billion, but less than $7.4 billion	100	400
Less than $ 6.8 billion	-	500

The Cobalt Success Payment and Cobalt Contingent Consideration liabilities are carried at fair value with changes in fair value recognized in research and development related success payments and contingent consideration. As of December 31, 2023 and 2022, the estimated fair value of the Cobalt Success Payment liability was $

11.2
million and $

19.0
million, respectively, and was recorded in long-term liabilities. In connection with the change in estimated fair value of the Cobalt Success Payment, the Company recognized gains of $

7.9
million and $

69.3
million, and an expense of $

23.6
million for the years ended December 31, 2023, 2022, and 2021, respectively.

As of December 31, 2023, the estimated fair value of the Cobalt Contingent Consideration was $

109.6
million, and was recorded in long-term liabilities. As of December 31, 2022, the estimated fair value of the Cobalt Contingent Consideration was $

150.4
million of which $

55.4
million was recorded in short-term liabilities and $

95.0
million was recorded in long-term liabilities. In connection with the change in estimated fair value of the Cobalt Contingent Consideration, the Company recognized gains of $

40.8
million and $

3.4
million, and an expense of $

31.8
million, for the years ended December 31, 2023, 2022, and 2021, respectively.

4. License and collaboration agreements

Beam Therapeutics Inc.

In October 2021, the Company entered into an option and license agreement with Beam Therapeutics Inc. (Beam), pursuant to which the Company was granted a non-exclusive license to use Beam's proprietary CRISPR Cas12b nuclease editing technology to research, develop, and commercialize engineered cell therapy products that (i) are directed to certain antigen targets, with respect to the Company's allogeneic T cell programs, or (ii) comprise certain human cell types, with respect to the Company's stem cell-derived programs. The Company made an upfront payment of $ 50.0 million to Beam, which was recorded in research and development expense for the year ended December 31, 2021. Additionally, under the terms of the agreement, the Company may be obligated to pay up to $ 65.0 million for each licensed product in specified developmental and commercial milestone payments and royalties on licensed products. At the time of the entry into the option and license agreement, a member of the Company's board of directors was a beneficial owner of greater than 10% of the outstanding shares of Beam. This director is also affiliated with a member of the board of directors of Beam.

President and Fellows of Harvard College

In March 2019, the Company entered into an exclusive license agreement with Harvard to access certain intellectual property for the development of hypoimmune-modified cells.

The Company paid to Harvard aggregate consideration of $ 12.0 million, comprising $ 9.0 million in common stock and $ 3.0 million in cash. Under the terms of the agreement, the Company may be required to pay to Harvard up to an aggregate of $ 175.0 million in success payments, payable in cash, based on increases in the fair value of the Company's common stock. The potential Harvard Success Payments are based on multiples of increased value ranging from 5x to 40x, based on a comparison of the fair market value of the Company's common stock relative to the original issuance price of $ 4.00 per share at ongoing pre-determined valuation measurement dates. The Harvard Success Payments can be achieved over a maximum of 12 years from the effective date of the agreement. If a higher success payment tier is first met at the same time a lower tier is first met, both tiers will be owed. Any previous success payments made to Harvard would be credited against the success payment owed as of any valuation measurement date so that Harvard does not receive multiple success payments in connection with the same threshold. As of December 31, 2023, a Harvard Success Payment had not been triggered.

The following table summarizes the potential success payments and common stock price required for payment:

Multiple of Equity Value at Issuance	5x	10x	20x	30x	40x
Per share common stock price required for payment	$ 20.00	$ 40.00	$ 80.00	$ 120.00	$ 160.00
Success payment(s) (in millions)	$ 5.0	$ 15.0	$ 30.0	$ 50.0	$ 75.0

The Harvard Success Payment liabilities are carried at fair value, with the initial value and changes in fair value recognized in research and development related success payments and contingent consideration. As of December 31, 2023 and December 31, 2022, the estimated fair value of the Harvard Success Payment liability was $ 1.6 million and $ 2.0, respectively, and was recorded in long-term liabilities. In connection with the change in the estimated fair value of the Harvard Success Payment liability, the Company recognized gains of $ 0.3 million and $ 12.2 million, and an expense of $ 2.4 million, for the years ended December 31, 2023, 2022, and 2021, respectively.

5. Restricted cash

The Company maintains standby letters of credit that are collateralized with a bank account at a financial institution in accordance with certain lease agreements. The aggregate amount of such standby letters of credit was $ 3.8 million and $ 10.5 million as of December 31, 2023 and 2022, respectively. The Company terminated the Fremont lease in the third quarter of 2023, and as a result, the Company's letter of credit of $ 6.7 million related to the Fremont lease was returned to the Company and included in cash and cash equivalents.

6. Fair value measurements

The following tables summarize the Company's financial assets and liabilities measured at fair value on a recurring basis based on the three-tier fair value hierarchy:

		December 31, 2023			
	Valuation Hierarchy	Amortized Cost	Gross Unrealized Holding Gains	Gross Unrealized Holding Losses	Estimated Fair Value
			(in thousands)		
Financial assets:					
Cash equivalents:					
Money market funds	Level 1	$ 70,315	$ -	$ -	$ 70,315
U.S. government and agency securities	Level 2	33,091	3	-	33,094
Corporate debt securities	Level 2	1,062	-	-	1,062
Total cash equivalents		104,468	3	-	104,471
Short-term marketable securities:					
U.S. government and agency securities	Level 2	57,924	7	(78)	57,853
Corporate debt securities	Level 2	13,817	9	(1)	13,825
Total short-term marketable securities		71,741	16	(79)	71,678
Other assets	Level 3	359	-	-	359
Total financial assets		$ 176,568	$ 19	$ (79)	$ 176,508
Financial liabilities:					
Long-term financial liabilities:					
Contingent consideration	Level 3	109,606	-	-	109,606
Success payment liabilities	Level 3	12,799	-	-	12,799
Total long-term financial liabilities		122,405	-	-	122,405
Total financial liabilities		$ 122,405	$ -	$ -	$ 122,405

	Valuation Hierarchy	December 31, 2022 Amortized Cost	Gross Unrealized Holding Gains	Gross Unrealized Holding Losses	Estimated Fair Value
			(in thousands)		
Financial assets:					
Cash equivalents:					
Money market funds	Level 1	$ 114,363	$ -	$ -	$ 114,363
U.S. government and agency securities	Level 2	40,532	10	-	40,542
Corporate debt securities	Level 2	9,796	1	(2)	9,795
Total cash equivalents		164,691	11	(2)	164,700
Short-term marketable securities:					
U.S. government and agency securities	Level 2	222,435	2	(3,711)	218,726
Corporate debt securities	Level 2	28,836	-	(364)	28,472
Total short-term marketable securities		251,271	2	(4,075)	247,198
Long-term marketable securities:					
U.S. government and agency securities	Level 2	10,314	-	(263)	10,051
Total long-term marketable securities		10,314	-	(263)	10,051
Other assets	Level 3	369	-	-	369
Total financial assets		$ 426,645	$ 13	$ (4,340)	$ 422,318
Financial liabilities:					
Short-term financial liabilities:					
Contingent consideration	Level 3	$ 55,345	$ -	$ -	$ 55,345
Total short-term financial liabilities		55,345	-	-	55,345
Long-term financial liabilities:					
Contingent consideration	Level 3	95,034	-	-	95,034

Success payment liabilities					
	Level 3	21,007	-	-	21,007
Total long-term financial liabilities					
		116,041	-	-	116,041
Total financial liabilities					
		$ 171,386	$ -	$ -	$ 171,386

The Company measures the fair value of money market funds based on quoted prices in active markets for identical assets or liabilities. The Level 2 marketable securities include U.S. government and agency securities and corporate debt securities and are valued based on either recent trades of securities in inactive markets or quoted market prices of similar instruments and other significant inputs derived from or corroborated by observable market data.

The following table summarizes available-for-sale debt securities in a continuous unrealized loss position for less than and greater than twelve months, for the periods presented:

	Less than 12 months		12 months or greater		Total	
	Fair value	Unrealized losses	Fair value	Unrealized losses	Fair value	Unrealized losses
	(in thousands)					
December 31, 2023						
U.S. government and agency securities	$ 9,186	$ (3)	$ 10,386	$ (75)	$ 19,572	$ (78)
Corporate debt securities	1,396	(1)	-	-	1,396	(1)
Total	$ 10,582	$ (4)	$ 10,386	$ (75)	$ 20,968	$ (79)
December 31, 2022						
U.S. government and agency securities	$ 49,253	$ (673)	$ 172,845	$ (3,301)	$ 222,098	$ (3,974)
Corporate debt securities	13,333	(16)	19,664	(350)	32,997	(366)
Total	$ 62,586	$ (689)	$ 192,509	$ (3,651)	$ 255,095	$ (4,340)

The Company determined that there was no material change in the credit risk of the above investments during the year ended December 31, 2023. As such, an allowance for credit losses has not been recognized. As of December 31, 2023, the Company does not intend to sell such securities, and it is not more-likely-than-not that the Company will be required to sell the securities prior to the recovery of the amortized cost basis.

As of December 31, 2023, all marketable securities had an effective maturity date of two years or less. Investments in securities with maturities of less than one year , or those for which management intends to use to fund current operations, are included in current assets and classified as available-for-sale. As of December 31, 2023 and 2022, the balance in accumulated other comprehensive loss included net unrealized gains (losses) related to the Company's available-for-sale debt securities.

The following table sets forth a summary of the changes in the fair value of the Company's Level 3 financial liabilities:

	Contingent Consideration	Cobalt Success Payment Liability	Harvard Success Payment Liability
		(in thousands)	
Balance as of December 31, 2022	$ 150,379	$ 19,016	$ 1,991
Changes in fair value – expense (gain)	5,460	(4,760)	(580)
Balance as of March 31, 2023	155,839	14,256	1,411
Changes in fair value – expense	5,895	18,505	2,279

Balance as of June 30, 2023	161,734	32,761	3,690
Changes in fair value - gain	(58,578)	(21,998)	(2,039)
Balance as of September 30, 2023	103,156	10,763	1,651
Changes in fair value - expense (gain)	6,450	397	(12)
Balance as of December 31, 2023	$ 109,606	$ 11,160	$ 1,639

Contingent consideration

The Company utilizes significant estimates and assumptions it believes would be made by a market participant in determining the estimated fair value of the Cobalt Contingent Consideration at each balance sheet date. The fair value of the Cobalt Contingent Consideration was determined by calculating the probability-weighted estimated value of the pre-specified development milestone payments based on the assessment of the likelihood and estimated timing that the milestones would be achieved and the applicable discount rates. The discount rate captures the credit risk associated with the payment of the contingent consideration when earned and due. The Company assesses these estimates on an ongoing basis as additional data impacting the assumptions are obtained.

The fair value of the Cobalt Contingent Consideration was calculated using the following unobservable inputs:

	December 31, 2023		December 31, 2022	
Unobservable Input	**Range**	**Weighted-Average**	**Range**	**Weighted-Average**
Discount rates	11.7% – 12.4%	11.9%	13.4% – 15.1%	14.6%
Probability of milestone achievement	5.0% – 55.0%	25.7%	5.0% – 85.0%	36.0%

The weighted-average unobservable inputs were calculated based on the relative value of the pre-specified development milestones. The estimated fair value of the Cobalt Contingent Consideration may change significantly as development progresses and additional data are obtained, impacting the assumptions regarding probabilities of successful achievement of the milestones used to estimate the fair value of the liability and the timing in which they are expected to be achieved. In evaluating the fair value assumptions, judgment is required to interpret the market data used to develop the estimates. The estimates of fair value may not be indicative of the amounts that could be realized in a current market exchange. Accordingly, the use of different market assumptions, inputs and/or different valuation techniques could result in materially different fair value estimates.

Success payments

The Company utilizes significant estimates and assumptions in determining the estimated fair value of the success payment liabilities and the associated expense or gain at each balance sheet date. The estimated fair value of the Cobalt Success Payment and Harvard Success Payment liabilities was determined using a Monte Carlo simulation methodology, which models the estimated fair value of the liability based on several key assumptions, including the expected volatility, remaining term, risk-free interest rate, estimated number and timing of valuation measurement dates on the basis of which payment may be triggered, and, for the Cobalt Success Payment, the Company's market capitalization, and for the Harvard Success Payments, the per share fair value of the Company's common stock.

The fair values of the Cobalt Success Payments and Harvard Success Payments were calculated using the following unobservable inputs:

	December 31, 2023		December 31, 2022	
Unobservable Input	**Cobalt**	**Harvard**	**Cobalt**	**Harvard**
Expected stock price volatility	72.5%	72.5%	70.0%	70.0%
Expected term (years)	15.1	7.2	16.1	8.2

7. Property and equipment, net

Property and equipment, net consists of the following:

	December 31, 2023	December 31, 2022
	(in thousands)	
Laboratory equipment	$ 51,643	$ 61,842
Leasehold improvements	31,361	34,427
Construction in progress	26,332	1,711
Computer equipment, software, and other	3,124	2,914
Total property and equipment, at cost	112,460	100,894
Less: Accumulated depreciation	(41,771)	(33,977)

Property and equipment, net	$ 70,689	$ 66,917

Depreciation expense was $ 24.6 million, $ 15.6 million, and $ 11.1 million for the years ended December 31, 2023, 2022, and 2021, respectively. Depreciation expense for the year ended December 31, 2023 includes $ 7.0 million for the impairment of certain lab equipment and leasehold improvements which were primarily related to the strategic repositioning undertaken in October 2023.

8. Accrued liabilities

Accrued compensation and accrued expenses and other current liabilities consist of the following:

	December 31, 2023	December 31, 2022
	(in thousands)	
Accrued compensation:		
Accrued bonuses	$ 14,379	$ 16,455
Accrued paid time off	4,731	4,794
Accrued payroll	3,936	5,113
Other accrued compensation	676	-
Total accrued compensation	$ 23,722	$ 26,362
Accrued expenses and other current liabilities:		
Accrued research and development services	$ 10,110	$ 8,733
Accrued professional fees	1,470	1,158
Accrued property and equipment	9,200	1,790
Other accrued current liabilities	2,682	2,866
Total accrued expenses and other current liabilities	$ 23,462	$ 14,547

9. Commitments and contingencies

Lease commitments

The Company's lease portfolio primarily comprises operating leases for office, laboratory, and manufacturing space. These leases contain various rent abatement periods, after which they require monthly lease payments that may be subject to annual increases throughout the lease term. Certain leases include options to extend the term. The renewal option is considered in the remaining lease term for the lease only when the Company is reasonably certain it will renew the lease. Certain leases provide the Company with the right to make tenant improvements, including the addition of laboratory space or build-out of manufacturing capabilities, and include a lease incentive allowance.

In June 2022, the Company entered into a lease agreement for

79,565

square feet of office, laboratory, and manufacturing space located in Bothell, Washington (the Bothell facility). The initial term of the lease expires in February 2039, with the option to extend the lease for up to three additional five-year terms. The lease agreement also provides for up to $

19.9

million for reimbursement of tenant improvements, as well as an additional $

8.0

million for tenant improvements, available at the Company's election, which the Company would be obligated to repay to the landlord monthly over the initial term of the lease with interest at a rate of

6.5

% per year. The Company is obligated to pay base rent of approximately $

68.8

million over the initial term of the lease. In accordance with the lease agreement, the Company has obtained a letter of credit in the amount of $

1.6

million. The Company recognized the ROU asset and lease liability in the three months ended March 31, 2023 when the lease commenced.

In July 2021, the Company entered into a lease for the Fremont facility with the intent to establish and develop its manufacturing operations at such facility. The Company decided in June 2022 to establish and develop its manufacturing operations at the Bothell facility rather than the Fremont facility. In the third quarter of 2023, the Company entered into a lease termination agreement for the early termination of the Fremont lease. On the lease termination date, the Company derecognized the remaining balances related to the ROU asset and lease liability of $

14.2
million and $

15.9
million, respectively, and incurred fees of $

4.4
million, resulting in a loss on lease termination of $

2.7
million, which is included in general and administrative expense for the twelve months ended December 31, 2023.

The following table contains additional information related to the Company's operating leases:

Location	Use	Approximate Square Footage	Commencement Dates	Expiration Dates
Seattle, WA	Office/Laboratory	48,000	March 2019 to September 2020	December 2026 to April 2028
Cambridge, MA	Office/Laboratory	60,000	March 2019 to January 2022	November 2025 to February 2028
South San Francisco, CA	Office/Laboratory	100,000	December 2019 to April 2022	April 2024 to April 2030
Rochester, NY	Office/Laboratory	3,000	January 2022	January 2025
Bothell, WA	Office/Laboratory/Manufacturing	80,000	January 2023	January 2039

Throughout the term of the lease agreements, the Company is responsible for paying, in addition to base rent, certain operating costs, such as common area maintenance, taxes, utilities, and insurance. These additional charges are considered variable lease costs and are recognized in the period in which the costs are incurred.

The following table summarizes the Company's lease costs:

	Year Ended December 31,		
	2023	2022	2021
	(in thousands)		
Operating lease cost	$ 27,277	$ 23,881	$ 16,425
Short-term lease cost	-	-	512
Variable lease cost	7,527	7,193	5,230
Total lease cost	$ 34,804	$ 31,074	$ 22,167

As of December 31, 2023, the weighted-average remaining lease term was 8.7 years and the weighted-average IBR was 11.1 %.

The following table reconciles the Company's undiscounted operating lease cash flows by fiscal year to the present value of the operating lease liabilities as of December 31, 2023 (in thousands):

2024	$ 23,965
2025	25,394
2026	22,472
2027	19,899
2028	15,226
2029 and thereafter	93,495
Total undiscounted lease payments	200,451
Less: imputed interest	(88,846)
Less: tenant improvement allowances	(7,509)
Present value of operating lease liabilities	104,096
Less: current portion of operating lease liabilities	(13,195)
	$

Operating lease liabilities, net of current portion	$ 90,901

10. Stockholders' equity

In August 2022, the Company entered into a sales agreement with Cowen, acting as sales agent, pursuant to which it may offer and sell through Cowen up to $ 150.0 million in shares of the Company's common stock from time to time in a series of one or more at the market equity offerings. As of December 31, 2023, the Company sold an aggregate of 4.7 million shares of the Company's common stock under the ATM facility, and received $ 27.6 million in net proceeds after deducting commissions and expenses.

11. Stock-based compensation

Equity incentive plans

In February 2021, the Company adopted the 2021 Incentive Award Plan (2021 Plan) and the 2021 Employee Stock Purchase Plan (2021 ESPP), both of which became effective on the completion of the Company's initial public offering. The 2021 Plan provides for a variety of stock-based compensation awards, including stock options, restricted stock awards (RSAs), and restricted stock units (RSUs). The 2021 ESPP allows eligible employees to purchase shares of the Company's common stock at a discount through payroll deductions of up to 15 % of their earnings, subject to plan limitations. Unless otherwise determined by the Company's board of directors, employees may purchase shares at 85 % of the lower of the fair market value of the Company's common stock on the first date of an offering period or on the purchase date. As of December 31, 2023, 17.8 million shares and 4.6 million shares were available for future issuance under the 2021 Plan and the 2021 ESPP, respectively.

Stock-based compensation expense

Stock-based compensation expense is recognized in the consolidated statements of operations as follows:

	Year Ended December 31,		
	2023	2022	2021
		(in thousands)	
Research and development	$ 23,240	$ 26,583	$ 15,239
General and administrative	12,293	11,754	7,123
Total stock-based compensation expense	$ 35,533	$ 38,337	$ 22,362

Unrecognized stock-based compensation costs related to unvested awards and the weighted-average period over which the costs are expected to be recognized as of December 31, 2023 are as follows:

	Stock Options	RSUs
Unrecognized stock-based compensation expense (in thousands)	$ 50,477	$ 6,983
Weighted-average period costs expected to be recognized (in years)	2.1	2.2

Stock options

A summary of the Company's stock option activity is as follows:

	Stock Options (in thousands)	Weighted-Average Exercise Price per Share	Weighted-Average Remaining Contractual Life (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding as of December 31, 2022	23,686	$ 7.79	8.3	$ 10,628
Granted	8,434	3.95		
Exercised	(1,146)	1.78		
Forfeited/Cancelled	(4,125)	9.33		
Outstanding as of December 31, 2023	26,849	$ 6.60	8.0	$ 11,235
Exercisable as of December 31, 2023	12,355	$ 7.20	7.2	$ 7,802

The fair value of stock options granted to employees, directors, and consultants was estimated on the date of grant using the Black-Scholes option pricing model using the following assumptions:

	Year Ended December 31,		
Assumptions	2023	2022	2021

Risk free interest rate			
	3.36% – 4.98%	1.56% – 4.31%	0.46% – 1.38%
Expected volatility			
	70.0% – 72.5%	70.0%	70.0%
Expected term (years)			
	5.50 – 6.50	5.50 – 6.25	5.50 – 6.40
Expected dividend			
	0%	0%	0%

The following table summarizes additional information related to stock option activity:

	Year Ended December 31,		
	2023	2022	2021
Weighted average grant date fair value per share for options granted			
	$ 2.62	$ 3.92	$ 14.22
Aggregate intrinsic value of stock options exercised (in thousands)			
	$ 3,532	$ 6,133	$ 29,880

Restricted stock

A summary of the Company's RSU activity is as follows:

	RSUs (in thousands)	RSUs Weighted-Average Grant Date Fair Value per Share
Unvested shares as of December 31, 2022	885	$ 6.66
Granted	2,304	3.55
Vested	(431)	6.88
Forfeited	(417)	4.78
Unvested shares as of December 31, 2023	2,341	$ 3.88

The fair value of vested RSAs was immaterial, $

1.8
million, and $

1.5
million for the years ended December 31, 2023, 2022, and 2021, respectively. The fair value of vested RSUs was $

1.9
million, $

0.5
million, and $

4.1
million for the years ended December 31, 2023, 2022, and 2021, respectively.

12. Income taxes

As of December 31, 2023, the Company had U.S. federal and state tax-effected net operating loss (NOL) carryforwards of $

146.9
million and $

45.3
million, respectively, which are available to reduce future taxable income. As of December 31, 2023, the Company also had federal and state research tax credits of $

49.4
million and $

19.6
million, respectively, which may be used to offset future liabilities. The Tax Cuts and Jobs Act enacted on December 22, 2017, altered the carryforward period for federal net operating losses and as a result, all net operating losses generated in 2018 and forward have an indefinite life. Of the federal net operating losses reported, we have accumulated $

145.2
million with an indefinite life as of December 31, 2023. The state NOL will begin to expire in 2036 . The federal tax credit carryforward will begin to expire in 2037 , and the state tax credit will carry forward indefinitely. The NOL and tax credit carryforwards may become subject to an annual limitation in the event of certain cumulative changes in the ownership interest. This could limit the amount of tax attributes that can be utilized annually to offset future taxable income or tax liabilities. Subsequent ownership changes may further affect the limitation in future years.

A reconciliation of income taxes computed using the U.S. federal statutory rate to that reflected in operations follows:

	Year Ended December 31,		
	2023	2022	2021
Federal statutory tax	21.00 %	21.00 %	21.00 %

State income tax, net of federal benefit	15.38	13.49	2.75
Valuation allowance	(45.30)	(43.69)	(24.06)
Success payment liabilities	0.58	5.40	(1.40)
Contingent consideration	3.02	0.26	(1.88)
Tax credits	6.59	4.93	2.58
Other	(1.27)	(1.39)	1.01
Effective income tax rate	0.00%	0.00%	0.00%

The principal components of the Company's net deferred tax assets are as follows:

	December 31,	
	2023	2022
	(in thousands)	
Deferred tax assets:		
Net operating loss carryforwards	$ 192,179	$ 154,888
Capitalized research and development	101,136	49,687
Tax credit carryforwards	69,070	44,051
Lease liabilities	31,503	28,050
Stock-based compensation	12,607	6,958
Intangibles	10,744	7,949
Accrued liabilities and allowances	6,050	6,807
Fixed assets	1,073	-
Success payment liabilities	496	516
Other	285	155
Gross deferred tax assets	425,143	299,061
Valuation allowance	(402,658)	(274,348)
Deferred tax assets, net of valuation allowance	22,485	24,713
Deferred tax liabilities:		
Right-of-use assets	(22,485)	(23,554)
Fixed assets	-	(1,159)
Net deferred taxes assets	$ -	$ -

The Tax Cuts and Jobs Act contained a provision which requires the capitalization of Section 174 costs incurred in years beginning on or after January 1, 2022. Section 174 costs are expenditures which represent research and development costs that are incident to the development or improvement of a product, process, formula, invention, computer software, or technique. This provision changes the treatment of Section 174 costs such that the expenditures are no longer allowed as an immediate deduction but rather must be capitalized and amortized over five years for domestic research and development and fifteen years for foreign research and development. We have included the impact of this provision, which results in a deferred tax asset of approximately $

101.1
million as of December 31, 2023.

The valuation allowance relates primarily to net U.S. deferred tax assets from operating losses, research tax credit carryforwards, capitalized research and development, and amounts paid and accrued to enter into various agreements for which the tax treatment requires capitalization and amortization.

The Company maintains a full valuation allowance on its net U.S. deferred tax assets. The assessment regarding whether a valuation allowance is required considers both positive and negative evidence when determining whether it is more likely than not that deferred tax assets are recoverable. In making this assessment, significant weight is given to evidence that can be objectively verified. In its evaluation, the Company considered its cumulative losses and its forecasted losses in the near term as significant negative evidence. Based upon a review of the four sources of income identified within ASC 740, *Accounting for Income Taxes*, the Company determined that the negative evidence outweighed the positive evidence, and a full valuation allowance on its net deferred tax assets should be maintained. The Company will continue to assess the realizability of its deferred tax assets going forward and will adjust the valuation allowance as needed.

The Company determines its uncertain tax positions based on a determination of whether and how much of the tax benefit the Company takes in its tax filings or positions is more likely than not to be sustained upon examination by the relevant income tax authorities. The Company is generally subject to examination by U.S. federal and local income tax authorities for all tax years in which the loss carryforward is available. The Company applies judgment in its determination of the financial statement recognition and measurement of tax positions taken or expected to be taken in a tax return. As of December 31, 2023 and 2022, the Company's uncertain tax positions were immaterial.

13. Net loss per share

Basic and diluted net loss per common share are calculated by dividing net loss by the weighted-average number of common shares outstanding during the period, without consideration for common stock equivalents. The Company was in a loss position for all periods presented, and basic net loss per share and diluted net loss per share are therefore the same for all periods, as the inclusion of all potential common securities outstanding would have been anti-dilutive.

The following securities were excluded from the computation of net loss per diluted share of common stock for periods presented as their effect would have been anti-dilutive:

	Year Ended December 31,		
	2023	2022	2021
		(in thousands)	
Options to purchase common stock	26,849	23,686	17,337
Unvested restricted common stock	-	12	4,365
Unvested RSUs	2,341	885	141
Total	29,190	24,583	21,843

14. Employee benefit plan

In January 2019, the Company adopted a 401(k) retirement and savings plan (the 401(k) Plan) covering all employees. The 401(k) Plan allows employees to make pre- and post-tax contributions up to the maximum allowable amount set by the IRS. The Company matches each participant's 401(k) contributions, up to $

4,000
per year per participant.

15. Subsequent event

In February 2024, the Company completed an underwritten public offering pursuant to which it sold

21.8
million shares of its common stock, including

4.5
million shares pursuant to the full exercise of the underwriters' option to purchase additional shares, and pre-funded warrants to purchase

12.7
million shares of its common stock, for net proceeds of approximately $

179.9
million, after deducting underwriting discounts and commissions and estimated offering expenses.

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

As of December 31, 2023, management, including our Chief Executive Officer and Chief Financial Officer, evaluated our disclosure controls and procedures as defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act. Our disclosure controls and procedures are designed to ensure that information required to be disclosed in the reports we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, to allow timely decisions regarding required disclosures.

Any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objective and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on this evaluation, our Chief Executive Officer and Chief Financial Officer concluded that, as of December 31, 2023, the design and operation of our disclosure controls and procedures were effective at a reasonable assurance level.

Management's Annual Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rule 13a-15(f) under the Exchange Act. Our internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of consolidated financial statements for external purposes in accordance with GAAP. Because of its inherent limitations, our internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with applicable policies or procedures may deteriorate.

Management has assessed the effectiveness of our internal control over financial reporting based on the framework set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control-Integrated Framework. Based on our evaluation, management has concluded that our internal control over financial reporting was effective as of December 31, 2023. Management reviewed the results of this assessment with our audit committee.

Attestation Report of the Registered Public Accounting Firm

This Annual Report does not include an attestation report of our registered public accounting firm due to an exemption established by the JOBS Act for "emerging growth companies."

Changes in Internal Control Over Financial Reporting

There has been no change in our internal control over financial reporting during the year ended December 31, 2023 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

Securities Trading Plans of Directors and Executive Officers

During our last fiscal quarter, the following officer, as defined in Rule 16a-1(f), adopted a "Rule 10b5-1 trading arrangement" as defined in Regulation S-K Item 408, as follows:

On December 26, 2023 , Christian Hordo , our Chief Business Officer , terminated a Rule 10b5-1 trading arrangement providing for the sale from time to time of an aggregate of up to

600,000

shares of our common stock. The trading arrangement was intended to satisfy the affirmative defense in Rule 10b5-1(c). The duration of the trading arrangement was until May 31, 2024 , or earlier if all transactions under the trading arrangement were completed. On December 26, 2023 , Mr. Hordo adopted a Rule 10b5-1 trading arrangement providing for the sale from time to time of an aggregate of up to

375,000

shares of our common stock. The trading arrangement is intended to satisfy the affirmative defense in Rule 10b5-1(c). The duration of the trading arrangement is until February 28, 2025 , or earlier if all transactions under the trading arrangement are completed.

No other officers or directors, as defined in Rule 16a-1(f), adopted and/or terminated a “Rule 10b5-1 trading arrangement” or a “non-Rule 10b5-1 trading arrangement,” as defined in Regulation S-K Item 408, during the last fiscal quarter.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this item is incorporated by reference from the information in our Proxy Statement, which will be filed not later than 120 days after December 31, 2023, in the sections titled “Information About Our Board of Directors,” “Information About Our Executive Officers Who Are Not Directors,” and “Corporate Governance.”

Item 11. Executive Compensation.

The information required by this item is incorporated by reference from the information in our Proxy Statement, which will be filed not later than 120 days after December 31, 2023, in the sections titled “Executive Compensation,” “Director Compensation,” and “Corporate Governance – Committees of the Board of Directors – Compensation Committee Interlocks and Insider Participation.”

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by this item is incorporated by reference from the information in our Proxy Statement, which will be filed not later than 120 days after December 31, 2023, in the sections titled “Securities Authorized For Issuance Under Equity Compensation Plans” and “Security Ownership of Certain Beneficial Owners and Management.”

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this item is incorporated by reference from the information in our Proxy Statement, which will be filed not later than 120 days after December 31, 2023, in the sections titled “Corporate Governance – Board of Directors Independence” and “Transactions With Related Persons.”

Item 14. Principal Accountant Fees and Services.

The information required by this item is incorporated by reference from the information in our Proxy Statement, which will be filed not later than 120 days after December 31, 2023, in the sections titled “Independent Registered Public Accounting Firm Fees and Services” and “Pre-Approval Policies and Procedures.”

PART IV

Item 15. Exhibits and Financial Statement Schedules.

Exhibit Index

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Herewith
		Form	Date	Number	
3.1	Amended and Restated Certificate of Incorporation	8-K	02/09/2021	3.1	
3.2	Amended and Restated Bylaws	8-K	02/09/2021	3.2	
4.1	Reference is made to Exhibits 3.1 through 3.2				
4.2	Form of Common Stock Certificate	S-1/A	01/28/2021	4.2	
4.3	Description of Securities Registered Pursuant to Section 12 of the Securities and Exchange Act of 1934, as amended	10-K	03/24/2021	4.3	
4.4	Form of Pre-Funded Warrant	8-K	02/08/2024	4.1	
10.1	Amended and Restated Investors' Rights Agreement, by and among the Company and the investors listed therein, dated as of February 13, 2019	S-1	01/13/2021	10.1	
10.2	Form of Indemnification and Advancement Agreement for directors and officers	S-1/A	01/28/2021	10.2	
10.3(a)#	2018 Equity Incentive Plan, as amended	10-Q	11/08/2021	10.3(a)	
10.3(b)#	Second Amendment to 2018 Equity Incentive Plan, dated as of November 9, 2020	S-1	01/13/2021	10.3(b)	
10.3(c)#	Third Amendment to 2018 Equity Incentive Plan, dated as of December 4, 2020	S-1	01/13/2021	10.3(c)	
10.3(d)#	Fourth Amendment to 2018 Equity Incentive Plan, dated as of December 8, 2021	10-K	03/16/2022	10.3(d)	
10.3(e)#	Form of Stock Option Grant Notice and Stock Option Agreement under 2018 Equity Incentive Plan	S-1	01/13/2021	10.3(d)	
10.4(a)#	2021 Incentive Award Plan	S-1/A	01/28/2021	10.4(a)	
10.4(b)#	First Amendment to 2021 Incentive Award Plan, dated as of December 8, 2021	10-K	03/16/2022	10.4(b)	
10.4(c)#	Form of Stock Option Grant Notice and Stock Option Agreement under the 2021 Incentive Award Plan	S-1/A	01/28/2021	10.4(b)	
10.4(d)#	Form of Stock Option Grant Notice and Stock Option Agreement under the 2021 Incentive Award Plan	10-K	03/16/2022	10.4(d)	
10.4(e)#	Form of Restricted Stock Award Grant Notice and Restricted Stock Award Agreement under the 2021 Incentive Award Plan	S-1/A	01/28/2021	10.4(c)	
10.4(f)#	Form of Restricted Stock Unit Award Grant Notice and Restricted Stock Unit Award Agreement under the 2021 Incentive Award Plan	S-1/A	01/28/2021	10.4(d)	
10.5#	2021 Employee Stock Purchase Plan	S-1/A	01/28/2021	10.5	
10.6#	Amendment No. 1 to the 2021 Employee Stock Purchase Plan, dated as of October 27, 2022	10-Q	11/02/2022	10.11	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Herewith
		Form	Date	Number	
10.7#	Offer Letter and Employment Agreement by and between the Company and Steven D. Harr, M.D., dated as of September 27, 2018	S-1	01/13/2021	10.6	
10.8#	Offer Letter and Employment Agreement by and between the Company and Richard Mulligan, Ph.D., dated as of April 23, 2020	S-1	01/13/2021	10.7	
10.9#	Offer Letter and Employment Agreement by and between the Company and Christian Hordo, dated as of November 10, 2018	S-1	01/13/2021	10.8	
10.10#	Offer Letter and Employment Agreement by and between the Company and Nathan Hardy, dated as of October 8, 2018	S-1	01/13/2021	10.9	
10.11#	Offer Letter by and between the Company and Bernard Cassidy, dated as of September 8, 2022	10-Q	11/02/2022	10.10	
10.12#	Non-Employee Director Compensation Program	10-K	03/16/2023	10.12	
10.13#	Offer Letter by and between the Company and Douglas E. Williams, dated as of April 8, 2023	10-Q	05/08/2023	10.2	
10.14(a)†	License Agreement by and between Flagship Pioneering Innovations V, Inc. (Flagship Innovations V) and Cobalt Biomedicine, Inc. (Cobalt), dated as of February 17, 2016	S-1	01/13/2021	10.12(a)	
10.14(b)†	First Amendment to License Agreement by and between Flagship Innovations V and Cobalt, dated as of February 14, 2019	S-1	01/13/2021	10.12(b)	
10.15(a)†	Patents Sub-License Agreement by and between La Societe Pulsalys (Pulsalys) and Cobalt, dated as of August 16, 2018	S-1	01/13/2021	10.13(a)	
10.15(b)†	Amendment No. 1 to Patents Sub-License Agreement by and between the Company, Pulsalys and Cobalt, dated as of May 26, 2020	S-1	01/13/2021	10.13(b)	
10.15(c)†	Amendment No. 2 to Patents Sub-License Agreement by and between the Company and Pulsalys, dated as of March 9, 2022	10-Q	11/02/2022	10.1	
10.15(d)†	Amendment No. 3 to Patents Sub-License Agreement by and between the Company and Pulsalys, dated as of July 31, 2023	10-Q	11/08/2023	10.1	
10.16(a)†	Exclusive License Agreement by and between the Company and The Regents of the University of California (The Regents) acting through The Technology Development Group of the University of California, Los Angeles (UCLA), dated as of March 22, 2019	S-1	01/13/2021	10.14	
10.16(b)†	First Amendment to Exclusive License Agreement by and between the Company and The Regents acting through The Technology Development Group of UCLA, dated as of May 21, 2021				X
10.17(a)†	License Agreement by and between the Company and President and Fellows of Harvard College (Harvard), dated as of March 19, 2019	S-1	01/13/2021	10.15(a)	
10.17(b)†	Amendment to License Agreement by and between the Company and Harvard, dated as of June 10, 2019	S-1	01/13/2021	10.15(b)	
10.17(c)†	Second Amendment to License Agreement by and between the Company and Harvard, dated as of December 15, 2020	S-1	01/13/2021	10.15(c)	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Herewith
		Form	Date	Number	
10.17(d)†	Third Amendment to License Agreement by and between the Company and Harvard, dated as of May 20, 2021	10-K	03/16/2022	10.15(d)	
10.17(e)†	Fourth Amendment to License Agreement by and between the Company and Harvard, dated as of October 25, 2021	10-K	03/16/2022	10.15(e)	
10.17(f)†	Fifth Amendment to License Agreement by and between the Company and Harvard, dated as of February 9, 2023	10-K	03/16/2023	10.16(f)	
10.18(a)†	Exclusive License Agreement by and between the Company and The Regents, acting through its Office of Technology Management, University of California San Francisco (UCSF), dated as of January 2, 2019	S-1	01/13/2021	10.16(a)	
10.18(b)†	Amendment No. 1 to Exclusive License Agreement by and between the Company and UCSF, dated as of December 3, 2020	S-1	01/13/2021	10.16(b)	
10.19†	Exclusive License Agreement by and between the Company and Washington University, dated as of November 14, 2019	S-1	01/13/2021	10.17	
10.20†	Exclusive License Agreement by and between the Company and Washington University, dated as of September 1, 2020	S-1	01/13/2021	10.18	
10.21(a)†	Amended and Restated Exclusive Patent License Agreement by and among the Company, Oscine Corp., and University of Rochester (Rochester), dated as of September 10, 2020	S-1	01/13/2021	10.19	
10.21(b)†	Amendment No. 1 to Amended and Restated Exclusive Patent License Agreement by and between the Company and Rochester, dated as of December 30, 2022				X
10.22#	Offer Letter and Employment Agreement by and between the Company and Sunil Agarwal, M.D., dated as of May 20, 2019	S-1	01/13/2021	10.22	
10.23#	Transition Agreement and Release by and between the Company and Sunil Agarwal, dated as of April 28, 2023	10-Q	05/08/2023	10.3	
10.24#	Consulting Agreement by and between the Company and Sunil Agarwal, dated as of April 29, 2023	10-Q	05/08/2023	10.4	
10.25(a)†	Option and License Agreement by and between the Company and Beam Therapeutics Inc. (Beam), dated as of October 15, 2021	10-Q	11/08/2021	10.1	
10.25(b)†	Amendment No. 1 to Option and License Agreement by and between the Company and Beam, dated as of June 6, 2022	10-Q	08/04/2022	10.2	
10.25(c)†	Amendment No. 2 to Option and License Agreement by and between the Company and Beam, dated as of July 19, 2022	10-Q	11/02/2022	10.2	
10.25(d)†	Amendment No. 3 to Option and License Agreement by and between the Company and Beam, dated as of March 17, 2023	10-Q	05/08/2023	10.1	
10.26†	Patent License Agreement by and between the Company and the U.S. Department of Health and Human Services, as represented by The National Cancer Institution, an institute of the National Institutes of Health, dated as of January 7, 2022	10-K	03/16/2022	10.25	
10.27†	Lease Agreement by and between the Company and ARE-Seattle No. 39, LLC, dated as of June 1, 2022	10-Q	08/04/2022	10.1	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Herewith
		Form	Date	Number	
10.28	Sales Agreement by and between the Company and Cowen and Company, LLC, dated as of August 4, 2022	S-3	08/04/2022	1.2	
10.29#	Change in Control Severance Plan and Summary Plan Description				X
21.1	List of Subsidiaries	10-K	03/24/2021	21.1	
23.1	Consent of Independent Registered Public Accounting Firm				X
24.1	Power of Attorney (reference is made to the signature page)				X
31.1	Certificate of Principal Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002				X
31.2	Certificate of Principal Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002				X
32.1*	Certificate of Principal Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002				X
32.2*	Certificate of Principal Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002				X
97.1	Compensation Recovery Policy				X
101.INS	Inline XBRL Instance Document				
101.SCH	Inline XBRL Taxonomy Extension Schema with Embedded Linkbase Document				
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)				

# Indicates management contract or compensatory plan.

† Certain portions of this document that constitute confidential information have been redacted in accordance with Regulation S-K Item 601(b)(10).

* These certifications are not deemed filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Annual Report, irrespective of any general incorporation language contained in such filing.

Item 16. Form 10-K Summary

Not applicable.

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 Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized in the City of Seattle, State of Washington on the 29th day of February 2024**.**

SANA BIOTECHNOLOGY, INC.

/s/ Steven D. Harr, M.D.
Name: Steven D. Harr, M.D.
Title: President and Chief Executive Officer
(Principal Executive Officer)

/s/ Nathan Hardy
Name: Nathan Hardy
Title: Chief Financial Officer
(Principal Financial and Accounting Officer)

POWER OF ATTORNEY

Each person whose individual signature appears below hereby authorizes and appoints Steven D. Harr, M.D., Nathan Hardy, and Bernard J. Cassidy and each of them, with full power of substitution and resubstitution and full power to act without the other, as his or her true and lawful attorney-in-fact and agent to act in his or her name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file any and all amendments to this Annual Report on Form 10-K and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his substitute or substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Steven D. Harr, M.D. Steven D. Harr, M.D.	President, Chief Executive Officer and Director (Principal Executive Officer)	February 29, 2024
/s/ Nathan Hardy Nathan Hardy	Chief Financial Officer (Principal Financial and Accounting Officer)	February 29, 2024
/s/ Hans E. Bishop Hans E. Bishop	Chairman of the Board	February 29, 2024
/s/ Joshua H. Bilenker, M.D. Joshua H. Bilenker, M.D.	Director	February 29, 2024
/s/ Douglas Cole, M.D. Douglas Cole, M.D.	Director	February 29, 2024
/s/ Richard Mulligan, Ph.D. Richard Mulligan, Ph.D.	Director	February 29, 2024
/s/ Robert Nelsen Robert Nelsen	Director	February 29, 2024
/s/ Alise S. Reicin, M.D. Alise S. Reicin, M.D.	Director	February 29, 2024
/s/ Michelle Seitz Michelle Seitz	Director	February 29, 2024
/s/ Mary Agnes (Maggie) Wilderotter Mary Agnes (Maggie) Wilderotter	Director	February 29, 2024
/s/ Patrick Y. Yang, Ph.D. Patrick Y. Yang, Ph.D.	Director	February 29, 2024

Exhibit 10.29

SANA BIOTECHNOLOGY, INC. CHANGE IN CONTROL SEVERANCE PLAN AND SUMMARY PLAN DESCRIPTION

(Amended February 27, 2024)

1.**Introduction**. This Sana Biotechnology, Inc. Change in Control Severance Plan (this "**Plan**") was established by the board of directors (the "**Board**") of Sana Biotechnology, Inc. (the "**Company**") effective as of December 19, 2018, and was amended effective February 27, 2024. The purpose of this Plan is to provide assurances of specified benefits to employees of the Company whose employment is subject to being involuntarily terminated other than for death, Disability, or Cause or voluntarily terminated for Good Reason under the circumstances described in this Plan. This Plan is an "employee benefit plan," as defined in Section 3(3) of ERISA. This document constitutes both the written instrument under which this Plan is maintained and the required summary plan description for this Plan.

2.**Important Terms**. The following words and phrases, when the initial letter of the term is capitalized, will have the meanings set forth in this Section 2, unless a different meaning is plainly required by the context:

2.1"**Administrator**" means the Board or any committee designated by the Board to administer this Plan, or any person to whom the Administrator has delegated any authority or responsibility with respect to this Plan pursuant to Section 12, but only to the extent of such delegation.

2.2"**Base Pay**" means an Eligible Employee's annualized base salary in effect immediately prior to the termination of employment (or if the termination is due to Good Reason based on a material reduction in base pay under Section 2.16, then the Eligible Employee's annualized base salary in effect immediately prior to such reduction).

2.3"**Cause**" means, with respect to an Eligible Employee, the occurrence of any of the following: (a) an act of dishonesty made by the Eligible Employee in connection with the Eligible Employee's responsibilities as an employee; (b) the Eligible Employee's conviction of, or plea of *nolo contendere* to, a felony or any crime involving fraud, embezzlement or any other act of moral turpitude, or a material violation of federal or state law by Eligible Employee that the Board reasonably determines has had or will have a material detrimental effect on the Company's reputation or business; (c) the Eligible Employee's gross misconduct; (d) the Eligible Employee's willful and material unauthorized use or disclosure of any proprietary information or trade secrets of the Company or any other party to whom the Eligible Employee owes an obligation of nondisclosure as a result of the Eligible Employee's relationship with the Company; (e) the Eligible Employee's willful breach of any material obligations under any written agreement or covenant with the Company; or (f) the Eligible Employee's continued substantial failure to perform the Eligible Employee's employment duties (other than as a result of the Eligible Employee's physical or mental incapacity) after the Eligible Employee has received a written demand of performance from the CEO (or in the case of Eligible Employees who are VPs, Directors, or Other Employees, from the CEO or such Eligible Employee's supervisor) that specifically sets forth the factual basis for the CEO's (or in the case of Eligible Employees who are VPs, Directors or Other Employees, the CEO's or the Eligible Employee's supervisor's) determination that the Eligible Employee has not substantially performed the Eligible Employee's duties and has failed to cure such non-performance to the CEO's (or in the case of Eligible

Employees who are VPs, Directors, or Other Employees, the CEO's or the Eligible Employee's supervisor's) reasonable satisfaction within thirty (30) business days after receiving such notice. For purposes of this Section 2.3, no act or failure to act shall be considered willful unless it is done in bad faith and without reasonable intent that the act or failure to act was in the best interest of the Company or required by law. Any act, or failure to act, based upon authority or instructions given to the Eligible Employee pursuant to a direct instruction from the CEO or based on the advice of counsel for the Company will be conclusively presumed to be done or omitted to be done by the Eligible Employee in good faith and in the best interest of the Company.

2.4 "**CEO**" means the Company's Chief Executive Officer.

2.5 "**Change in Control**" shall have the meaning ascribed such term in the Company's 2018 Equity Incentive Plan, provided, that such event constitutes a "change in control event" within the meaning of Section 409A of the Code.

2.6"**Change in Control Period**" means the time period beginning on the date that is three (3) months prior to a Change in Control and ending on the date that is twelve (12) months following the Change in Control.

2.7 "**Code**" means the Internal Revenue Code of 1986, as amended.

2.8 "**Company**" means Sana Biotechnology, Inc., a Delaware corporation, and any successor that assumes the obligations of the Company under this Plan, by way of merger, acquisition, consolidation or other transaction.

2.9 "**Confidential Information**" means information (including combinations of individual items of information) that the Company has or will develop, acquire, create, compile, discover, or own, that has value in or to Company's business that is not generally known and that the Company wishes to maintain as confidential. "Confidential Information" includes both information disclosed by the Company to Eligible Employee and information developed or learned by Eligible Employee during the course of employment with the Company. "Confidential Information" also includes all information of which the unauthorized disclosure could be detrimental to the interests of the Company, whether or not the information is identified as Confidential Information. "Confidential Information" includes non-public information that relates to the actual or anticipated business or products, research, or development of the Company, or to the Company's technical data, trade secrets, or know-how, including research, product plans, or other information regarding the Company's products, services, markets, customer lists, and customers (including customers of the Company on which Eligible Employee called or with which Eligible Employee may become acquainted during the term of Eligible Employee's employment), software, developments, inventions, discoveries, ideas, processes, formulas, technology, designs, drawings, engineering, hardware configuration information, marketing, finances, and other business information disclosed by the Company either directly or indirectly in writing, orally or by drawings or inspection of premises, parts, equipment, or other Company property. "Confidential Information" does not include any information that (a) was publicly known or made generally available prior to the time of disclosure by the Company to Eligible Employee; (b) becomes publicly known or made generally available after disclosure by the Company to Eligible Employee through no wrongful action or omission by Eligible Employee; or (c) is in Eligible Employee's rightful possession, without confidentiality obligations, at the time of disclosure by the Company as shown by Eligible Employee's then-contemporaneous written records, except that

any combination of individual items of information shall not be deemed to be within any of those exceptions merely because one or more of the individual items are within that exception, unless the combination as a whole is within that exception.

2.10 "**Director**" means an Eligible Employee with a Director level job (including any Executive Director, Senior Director or Director job level, defined in the Company's job structure as Levels 11, 10 and 9) with the Company or any subsidiary of the Company.

2.11 "**Disability**" means a total and permanent disability as defined in Section 22(e)(3) of the Code unless the Company maintains a long-term disability plan at the time of the Eligible Employee's termination, in which case the determination of disability under such plan also will be considered "Disability" for purposes of this Plan.

2.12 "**Eligible Employee**" means an employee of the Company or any parent or subsidiary of the Company as of the date of a Change in Control.

2.13 "**Equity Award**" means an outstanding award granted to an Eligible Employee by the Company pursuant to the Company's 2018 Equity Incentive Plan or 2021 Incentive Award Plan, each, as may be amended from time to time, to purchase or receive Shares, including any such award as assumed by, or any award granted in substitution for such awards by, a successor to the Company.

2.14 "**ERISA**" means the Employee Retirement Income Security Act of 1974, as amended.

2.15 "**EVP**" means an Eligible Employee with the job level of "Executive Vice President" with the Company or any subsidiary of the Company.

2.16 "**Good Reason**" means, the Eligible Employee's resignation within thirty (30) days following the end of the Cure Period (as defined below), without the Eligible Employee's express written consent, of one or more of the following: (a) a material reduction by the Company in the Eligible Employee's annual target cash compensation (including Base Pay and target bonus); (b) a material diminution of the Eligible Employee's authority, duties, or responsibilities relative to the Eligible Employee's authority, duties, or responsibilities in effect immediately prior to such reduction; (c) a change in the location of the Eligible Employee's employment of more than fifty (50) miles; or (d) the Company's material breach of the terms of any material written agreement or covenant with the Eligible Employee related to the Eligible Employee's provision of services to the Company. In order for an event to qualify as Good Reason, the Eligible Employee must not terminate employment with the Company without first providing the Company with written notice of the acts or omissions constituting the grounds for "Good Reason" within ninety (90) days of the initial existence of the grounds for "Good Reason" and a reasonable cure period of thirty (30) days following the date of written notice (the "**Cure Period**"), and such grounds must not have been cured during such time.

2.17 "**Other Employee**" means an Eligible Employee who is not an EVP, SVP, VP or Director (defined in the Company's job structure as Levels 1 through 8).

2.18 "**Section 409A Limit**" means two (2) times the lesser of: (i) the Eligible Employee's annualized compensation based upon the annual rate of pay paid to the Eligible Employee during the Eligible Employee's taxable year preceding the Eligible Employee's taxable

year of the Eligible Employee's termination of employment as determined under, and with such adjustments as are set forth in, Treasury Regulation 1.409A-1(b)(9)(iii)(A)(1) and any Internal Revenue Service guidance issued with respect thereto; or (ii) the maximum amount that may be taken into account under a qualified plan pursuant to Section 401(a)(17) of the Code for the year in which the Eligible Employee's employment is terminated.

2.19"**SVP**" means an Eligible Employee with the job level of "Senior Vice President" with the Company or any subsidiary of the Company.

2.20"**Severance Benefits**" means the compensation and other benefits that the Eligible Employee will be provided under the circumstances described in Section 5.

2.21 "**Severance Term**" means the period of time following the Eligible Employee's Involuntary Termination as set forth below:

(a) **Tier 1**: 12 months

(b) **Tier 2**: 9 months

(c) **Tier 3**: 6 months

2.22 "**Share**" means a share of the Company's common stock.

2.23"**Target Bonus**" means either (i) the Eligible Employee's target bonus percentage multiplied by the Eligible Employee's Base Pay or (ii) the target bonus amount (as applicable), in each case, as in effect for the Company's (or its successor's) fiscal year in which the Eligible Employee's Involuntary Termination occurs.

2.24"**Territory**" means (a) all counties in the State of Washington, (b) all other states of the United States of America; and (c) all other countries of the world; provided that, with respect to clauses (b) and (c), the Company maintains operations, facilities, or customers in such geographic area prior to the date of the termination of the Eligible Employee's relationship with the Company.

2.25"**Tier**" means the tier of Severance Benefits an Eligible Employee is entitled to receive under this Plan pursuant to Section 5, depending on the rank of the Eligible Employee on the date the right to Severance Benefits is triggered, as set forth below:

2.25.1 "**Tier 1**" applies to any Eligible Employee who is an EVP or an SVP.

2.25.2 "**Tier 2**" applies to any Eligible Employee who is a VP or a Director.

2.25.3 "**Tier 3**" applies to any Eligible Employee who is an Other Employee.

2.26"**VP**" means an Eligible Employee with the job level of "Vice President" with the Company or any subsidiary of the Company.

3.**Change in Control Benefits**. In the event that the successor corporation does not

assume, or provide a substantially economically equivalent substitute award with the same vesting schedule or vesting provisions that are more favorable to the Eligible Employee, for an Equity Award held by an Eligible Employee, such Equity Award will become fully vested and exercisable, if applicable, immediately prior to the Change in Control, in accordance with the terms and conditions of this Plan, provided that any Equity Award that is subject to performance-based vesting shall vest based on the greater of: (a) the number of shares that would have vested (if any) if the performance period ended immediately prior to such Change in Control (based on the actual performance level achieved through such time), or (b) the target award amount.

4. **Eligibility for Severance Benefits**. An individual is eligible for Severance Benefits under this Plan, as described in Section 5, only if he or she is an Eligible Employee on the date he or she experiences an Involuntary Termination.

5. **Termination During the Change in Control Period**. If, during the Change in Control Period, (i) an Eligible Employee terminates his or her employment with the Company (or any parent or subsidiary of the Company) for Good Reason, or (ii) the Company (or any parent or subsidiary of the Company) terminates the Eligible Employee's employment for a reason other than Cause and other than the Eligible Employee's death or Disability (any such termination of employment described in (i) or (ii), an "**Involuntary Termination**"), then, subject to the Eligible Employee's compliance with Section 7, the Eligible Employee will receive the following Severance Benefits from the Company:

5.1 **Salary Severance Benefits**. A lump-sum payment of cash salary severance equal to the number of months of annualized Base Pay as set forth below:

(a) **Tier 1**: 12 months

(b) **Tier 2**: 9 months

(c) **Tier 3**: 6 months

5.2 **Bonus Severance Benefits**. A lump-sum payment of cash bonus severance as set forth below:

(a) **Tier 1**: 100% of the Target Bonus

(b) **Tier 2 and Tier 3**: 100% of the Target Bonus, prorated based on the proportion of the then current fiscal year the Eligible Employee served through the date of the Eligible Employee's Involuntary Termination

5.3 **Continued Medical Benefits**. If the Eligible Employee, and any spouse and/or dependents of the Eligible Employee ("**Family Members**") has coverage on the date of the Eligible Employee's Involuntary Termination under a group health plan sponsored by the Company (or by any parent or subsidiary of the Company), the Company will incur on behalf of Eligible Employee the total applicable premium cost for continued group health plan coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended ("**COBRA**") during the period of time following the Eligible Employee's employment termination, as set forth below, provided that the Eligible Employee validly elects and is eligible to continue coverage under COBRA for the Eligible Employee and his Family Members.

(a) **Tier 1**: 12 months

(b) **Tier 2**: 9 months

(c) **Tier 3**: 6 months

5.4 **Equity Award Vesting Acceleration**. Accelerated vesting as to 100% of any of the Eligible Employee's Equity Awards that were outstanding as of immediately prior to such Eligible Employee's Involuntary Termination; provided that any Equity Award that is subject to performance-based vesting shall vest based on the greater of: (a) the number of shares that would have vested (if any) if the performance period ended immediately prior to the Change in Control (based on the actual performance level achieved through such time), or (b) the target award amount.

6. **Limitation on Payments**. In the event that the payments and benefits provided for in this Plan or other payments and benefits payable or provided to the Eligible Employee (i) constitute "parachute payments" within the meaning of Section 280G of the Code and (ii) but for this Section 6, would be subject to the excise tax imposed by Section 4999 of the Code, then the Eligible Employee's payments and benefits under this Plan or other payments or benefits (the "**280G Amounts**") will be either:

(a) delivered in full; or

(b) delivered as to such lesser extent that would result in no portion of the 280G Amounts being subject to the excise tax under Section 4999 of the Code; whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the excise tax imposed by Section 4999, results in the receipt by the Eligible Employee on an after-tax basis, of the greatest amount of 280G Amounts, notwithstanding that all or some portion of the 280G Amounts may be taxable under Section 4999 of the Code.

6.2 **Reduction Order**. In the event that a reduction of 280G Amounts is made in accordance with Section 6, the reduction will occur, with respect to the 280G Amounts considered parachute payments within the meaning of Section 280G of the Code, in the following order:

(a) reduction of cash payments in reverse chronological order (that is, the cash payment owed on the latest date following the occurrence of the event triggering the excise tax will be the first cash payment to be reduced);

(b) cancellation of equity awards that were granted (i) "contingent on a change in ownership or control" within the meaning of Code Section 280G or (ii) vest based on a performance condition that is deemed satisfied as the result of the event giving rise to the parachute payment;

(c) reduction of the accelerated vesting of equity awards in the reverse order of date of grant of the awards (i.e., the vesting of the most recently granted equity awards will be cancelled first); and

(d) reduction of employee benefits in reverse chronological order (i.e., the benefit owed on the latest date following the occurrence of the event triggering the excise tax will be the first benefit to be reduced).

In no event will the Eligible Employee have any discretion with respect to the ordering of payment reductions.

6.3 **Nationally Recognized Firm Requirement**. Unless the Company and the Eligible Employee otherwise agree in writing, any determination required under this Section 6 will be made in writing by a nationally recognized accounting, consulting or valuation firm (the "**Firm**") selected by the Administrator, whose determination will be conclusive and binding upon the Eligible Employee and the Company for all purposes. For purposes of making the calculations required by this Section 6, the Firm may make reasonable assumptions and approximations concerning applicable taxes and may rely on reasonable, good faith interpretations concerning the application of Sections 280G and 4999 of the Code. The Company and the Eligible Employee will furnish to the Firm such information and documents as the Firm may reasonably request in order to make a determination under this Section 6. The Company will bear all costs for payment of the Firm's services in connection with any calculations contemplated by this Section 6.

7.**Conditions to Receipt of Severance**. Eligible Employee is required to comply with all the conditions set forth in this Section 7 to receive Severance Benefits under this Plan.

7.1**Release Agreement**. As a condition to receiving the Severance Benefits under this Plan, each Eligible Employee will be required to sign and not revoke a separation and release of claims agreement in a form reasonably acceptable to the Company (the "**Release**"), with such changes as may be required by applicable law. In all cases, the Release must become effective and irrevocable no later than the sixtieth (60th) day following the Eligible Employee's Involuntary Termination (the "**Release Deadline Date**"). If the Release does not become effective and irrevocable by the Release Deadline Date, the Eligible Employee will forfeit any right to the Severance Benefits. In no event will the Severance Benefits be paid or provided until the Release becomes effective and irrevocable.

7.2 **Non-Competition and Non-Solicitation**.

7.2.1 As a condition of receiving the Severance Benefits under this Plan, and in order to protect Confidential Information, each Eligible Employee will not, either directly or indirectly, during the Severance Term:

(a) (i) serve as an advisor, agent, consultant, director, employee, officer, partner, proprietor or otherwise of, (ii) have any ownership interest in (except for passive ownership of one percent (1%) or less of any entity whose securities have been registered under the Securities Act of 1933, as amended, or Section 12 of the Securities Exchange Act of 1934, as amended), or (iii) participate in the organization, financing, operation, management or control of, any business in competition with the Company's business as conducted by the Company at any time during the course of Eligible Employee's employment with the Company. This covenant shall cover Eligible Employee's activities in every part of the Territory, as defined herein, to the extent permitted by applicable law. Eligible Employee acknowledges and agrees that fulfillment of the obligations contained in this covenant, including, but not limited to, Eligible Employee's obligation neither to use, except for the benefit of the Company, or to disclose the Company's Confidential Information and Eligible Employee's obligation not to compete is necessary to protect the Company's Confidential Information and to preserve the Company's value and goodwill. Eligible Employee further acknowledges the time, geographic, and scope limitations of Eligible Employee's obligations under this Section 7.2 are reasonable, especially in light of the Company's desire to protect its Confidential Information, and that Eligible Employee will not be

precluded from gainful employment if Eligible Employee is obligated not to compete with the Company during the period and within the Territory as described above. This Section 7.2.1(a) and Section 7.2.1(b) shall apply to each Eligible Employee, except to the extent that such Eligible Employee was a resident of California on the termination date or otherwise as prohibited by applicable law, and Sections 7.2.1(a) through 7.2.1(d) shall apply to Eligible Employees in Germany solely to the extent such provisions comply with applicable law governing such employees. Notwithstanding the foregoing sentence, in no event shall any Eligible Employee use Confidential Information for any purpose, whether to compete or solicit or service customers, or otherwise.

(b) solicit sales from any of the Company's customers for any product or service that (i) competes with any product or service sold or provided by the Company,
(ii) competes with any product or service intended to be sold or provided by the Company at the time of the termination of Eligible Employee's employment with the Company, or (iii) competed with any product or service sold or provided by the Company at any time during Eligible Employee's employment with the Company;

(c) entice any vendor, consultant, collaborator, agent, or contractor of the Company to cease its business relationship with the Company or engage in any activity that would cause them to cease their business relationship with Company; or

(d) solicit, induce, recruit, or encourage any of the Company's employees to leave their employment, or attempt to solicit, induce, recruit, encourage, or take away the Company employees.

7.2.2 **Severability**. The covenants contained in Section 7.2 shall be construed as a series of separate covenants, one for each city, county and state of any geographic area in the Territory.

Except for geographic coverage, each such separate covenant shall be deemed identical in terms to the covenant contained in subsection 7.2.1 above. If, in any judicial or arbitration proceeding, a court or arbitrator refuses to enforce any of such separate covenants (or any part thereof), then such unenforceable covenant (or such part) shall be eliminated from this Agreement to the extent necessary to permit the remaining separate covenants (or portions thereof) to be enforced. In the event the provisions of subsection 7.2.1 above are deemed to exceed the time, geographic, or scope limitations permitted by applicable law, then such provisions shall be reformed by the court or arbitrator to cover the maximum time, geographic, or scope limitations, as the case may be, then permitted by such law.

7.2.3 **Reasonableness**. The nature of the Company's business is such that if Eligible Employee were to become employed by, or substantially involved in, the business of a competitor to the Company, it would be difficult not to rely on or use Confidential Information. Therefore, Eligible Employee enters into this Agreement to reduce the likelihood of disclosure of Confidential Information, as well as to protect the value and goodwill of the Company. Eligible Employee acknowledge that the limitations of time, geography, and scope of activity agreed to above are reasonable because, among other things, (a) the Company is engaged in a highly competitive industry, (b) Eligible Employee will have access to Confidential Information, including but not limited to, the Company's trade secrets, know-how, plans, and strategy (and in particular, the competitive strategy of the Company), (c) in the event Eligible Employee's employment with the Company ends, Eligible Employee will be able to obtain suitable and satisfactory employment in Eligible Employee's chosen profession without violating this

Agreement, and (d) these limitations are necessary to protect Confidential Information and the goodwill of the Company.

7.3 **Non-Disparagement**. During the Severance Term, Eligible Employee agrees to refrain from any disparagement, defamation, libel, or slander of the Company, and agrees to refrain from any tortious interference with the contracts and relationships of the Company. For the avoidance of doubt, reports to, or responses to inquiries by, auditors, the Company's Board of Directors, the audit committee, or any government agency, as long as such reports or responses are truthful, shall not constitute disparagement.

7.4 **Other Requirements**. An Eligible Employee's receipt of Severance Benefits will be subject to the Eligible Employee continuing to comply with the provisions of this Section 7 and the terms of any confidentiality, proprietary information and inventions agreement, including any non-competition and non-solicitation covenants contained therein (which are additional obligations, and not replaced by the provisions of this Section 7), and such other appropriate agreements between the Eligible Employee and the Company. Severance Benefits under this Plan will terminate immediately for an Eligible Employee if the Eligible Employee, at any time, violates any such agreement and/or the provisions of this Section 7.

7.5 **Whistleblower Protection**. Notwithstanding anything to the contrary in this Plan or in any Release contemplated under Section 7, pursuant to 18 U.S.C. § 1833(b), the Eligible Employee understands that the Eligible Employee will not be held criminally or civilly liable under any Federal or State trade secret law for the disclosure of a trade secret of the Company that (i) is made (A) in confidence to a Federal, State, or local government official, either directly or indirectly, or to the Eligible Employee's attorney and (B) solely for the purpose of reporting and investigating a suspected violation of law; or (ii) is made in a complaint or other document that is filed under seal in a lawsuit or other proceeding. The Eligible Employee understands that if the Eligible Employee files a lawsuit for retaliation by the Company for reporting a suspected violation of law, the Eligible Employee may disclose the trade secret to the Eligible Employee's attorney and use the trade secret information in the court proceeding if the Eligible Employee (x) files any document containing the trade secret under seal, and (y) does not disclose the trade secret, except pursuant to court order. Nothing in this Plan, any Release contemplated under Section 7, or any other agreement that the Eligible Employee has with the Company, is intended to conflict with 18 U.S.C. § 1833(b) or create liability for disclosures of trade secrets that are expressly allowed by such section. Further, nothing in this Plan, any Release contemplated under Section 7 or any other agreement that the Eligible Employee has with the Company shall prohibit or restrict the Eligible Employee from making any voluntary disclosure of information or documents concerning possible violations of law to, or seek a whistleblower award from, any governmental agency or legislative body, or any self-regulatory organization, in each case, without advance notice to the Company.

8. **Timing of Severance Benefits**. Provided that the Release becomes effective and irrevocable by the Release Deadline Date and subject to Section 10, the severance payments and benefits under this Plan will be paid, or in the case of installments, will commence, on the Release Deadline Date (such payment date, the "**Severance Start Date**"), and any severance payments or benefits otherwise payable to the Eligible Employee during the period immediately following the Eligible Employee's termination of employment with the Company through the Severance Start Date will be paid in a lump sum to the Eligible Employee on the Severance Start Date, with any remaining payments to be made as provided in this Plan.

9. **Non-Duplication of Benefits; Survival of Other Benefits**. Notwithstanding any

other provision in this Plan to the contrary, if the Eligible Employee is entitled to any severance, change in control or similar benefits outside of this Plan by operation of applicable law or under another Company-sponsored plan, policy, contract, or arrangement, his or her benefits under this Plan will be reduced by the value of the severance, change in control or similar benefits that the Eligible Employee receives by operation of applicable law or under any Company-sponsored plan, policy, contract, or arrangement, all as determined by the Administrator in its discretion. Subject to the foregoing, this Plan is not intended to amend, modify, terminate, or supersede any severance, change in control or similar benefits provided under any contract with any Eligible Employee, and to the extent any such contract offers severance, change in control or similar benefits that are more advantageous to the Eligible Employee than the terms hereof, such Eligible Employee shall continue to be entitled to such benefits.

10. **Section 409A**.

10.1 Notwithstanding anything to the contrary in this Plan, no severance payments or benefits to be paid or provided to an Eligible Employee, if any, under this Plan that, when considered together with any other severance payments or separation benefits, are considered deferred compensation under Section 409A of the Code, and the final regulations and any guidance promulgated thereunder ("**Section 409A**") (together, the "**Deferred Payments**") will be paid or provided until the Eligible Employee has a "separation from service" within the meaning of Section 409A. Similarly, no severance payable to an Eligible Employee, if any, under this Plan that otherwise would be exempt from Section 409A pursuant to Treasury Regulation Section 1.409A-1(b)(9) will be payable until the Eligible Employee has a "separation from service" within the meaning of Section 409A.

10.2 It is intended that none of the severance payments or benefits under this Plan will constitute Deferred Payments but rather will be exempt from Section 409A as a payment that would fall within the "short-term deferral period" as described in Section 10.4 below or resulting from an involuntary separation from service as described in Section 10.5 below. In no event will an Eligible Employee have discretion to determine the taxable year of payment of any Deferred Payment.

10.3 Notwithstanding anything to the contrary in this Plan, if an Eligible Employee is a "specified employee" within the meaning of Section 409A at the time of the Eligible Employee's separation from service (other than due to death), then the Deferred Payments, if any, that are payable within the first six (6) months following the Eligible Employee's separation from service, will become payable on the earlier of (i) the date six (6) months and one (1) day following the date of the Eligible Employee's separation from service, (ii) the date of the Eligible Employee's death or (iii) such earlier date as complies with the requirements of Section 409A. All subsequent Deferred Payments, if any, will be payable in accordance with the payment schedule applicable to each payment or benefit. Each payment and benefit payable under this Plan is intended to constitute a separate payment under Section 1.409A-2(b)(2) of the Treasury Regulations.

10.4 Any amount paid under this Plan that satisfies the requirements of the "short-term deferral" rule set forth in Section 1.409A-1(b)(4) of the Treasury Regulations will not constitute Deferred Payments for purposes of Section 10.1 above.

10.5 Any amount paid under this Plan that qualifies as a payment made as a result of an involuntary separation from service pursuant to Section 1.409A-1(b)(9)(iii) of the Treasury Regulations that does not exceed the Section 409A Limit will not constitute Deferred Payments

for purposes of Section 10.1 above.

10.6The foregoing provisions are intended to comply with or be exempt from the requirements of Section 409A so that none of the payments and benefits to be provided under this Plan will be subject to the additional tax imposed under Section 409A, and any ambiguities herein will be interpreted to so comply or be exempt. Notwithstanding anything to the contrary in this Plan, including but not limited to Sections 12 and 14, the Company reserves the right to amend this Plan as it deems necessary or advisable, in its sole discretion and without the consent of the Eligible Employees, to comply with Section 409A or to avoid income recognition under Section 409A prior to the actual payment of benefits under this Plan or imposition of any additional tax. In no event will the Company reimburse an Eligible Employee for any taxes that may be imposed on the Eligible Employee as result of Section 409A.

11. **Withholdings**. The Company will withhold from any payments or benefits under this Plan all applicable U.S. federal, state, local and non-U.S. taxes required to be withheld and any other required payroll deductions.

12. **Administration**. The Board is the administrator of this Plan (within the meaning of section 3(16)(A) of ERISA). This Plan will be administered and interpreted by the Administrator (in his or her sole discretion). The Administrator is the "named fiduciary" of this Plan for purposes of ERISA and will be subject to the fiduciary standards of ERISA when acting in such capacity. Any decision made or other action taken by the Administrator with respect to this Plan, and any interpretation by the Administrator of any term or condition of this Plan, or any related document, will be conclusive and binding on all persons and be given the maximum possible deference allowed by law. In accordance with Section 2.1, the Administrator (a) may, in its sole discretion and on such terms and conditions as it may provide, delegate in writing to one or more officers of the Company all or any portion of its authority or responsibility with respect to this Plan, and (b) has the authority to act for the Company (in a non-fiduciary capacity) as to any matter pertaining to this Plan; provided, however, that any Plan amendment or termination or any other action that reasonably could be expected to increase materially the cost of this Plan must be approved by the Board.

13. **Eligibility to Participate**. To the extent that the Administrator has delegated administrative authority or responsibility to one or more officers of the Company in accordance with Sections 2.1 and 12, each such officer will not be excluded from participating in this Plan if otherwise eligible, but he or she is not entitled to act upon or make determinations regarding any matters pertaining specifically to his or her own benefit or eligibility under this Plan. The Administrator will act upon and make determinations regarding any matters pertaining specifically to the benefit or eligibility of each such officer under this Plan.

14. **Amendment or Termination**. Prior to the consummation of a Change in Control, the Company, by action of the Administrator, reserves the right to amend or terminate this Plan at any time, without advance notice to any Eligible Employee and without regard to the effect of the amendment or termination on any Eligible Employee or on any other individual. Any amendment or termination of this Plan will be in writing. Any action of the Company in amending or terminating this Plan will be taken in a non-fiduciary capacity. On or following the consummation of a Change in Control, this Plan may not be terminated or amended until the later of the 12-month anniversary of the consummation of the Change in Control or the date all payments and benefits eligible to be received hereunder shall have been paid.

15. **Claims and Appeals**.

15.1**Claims Procedure**. Any employee or other person who believes he or she is entitled to any payment under this Plan may submit a claim in writing to the Administrator within ninety (90) days of the earlier of (i) the date the claimant learned the amount of his or her benefits under this Plan or (ii) the date the claimant learned that he or she will not be entitled to any benefits under this Plan. If the claim is denied (in full or in part), the claimant will be provided a written notice explaining the specific reasons for the denial and referring to the provisions of this Plan on which the denial is based. The notice also will describe any additional information needed to support the claim and this Plan's procedures for appealing the denial. The denial notice will be provided within ninety (90) days after the claim is received. If special circumstances require an extension of time (up to ninety (90) days), written notice of the extension will be given within the initial ninety (90) day period. This notice of extension will indicate the special circumstances requiring the extension of time and the date by which the Administrator expects to render its decision on the claim.

15.2 **Appeal Procedure**. If the claimant's claim is denied, the claimant (or his or her authorized representative) may apply in writing to the Administrator for a review of the decision denying the claim. Review must be requested within sixty (60) days following the date the claimant received the written notice of their claim denial or else the claimant loses the right to review. The claimant (or representative) then has the right to review and obtain copies of all documents and other information relevant to the claim, upon request and at no charge, and to submit issues and comments in writing. The Administrator will provide written notice of its decision on review within sixty (60) days after it receives a review request. If additional time (up to sixty (60) days) is needed to review the request, the claimant (or representative) will be given written notice of the reason for the delay. This notice of extension will indicate the special circumstances requiring the extension of time and the date by which the Administrator expects to render its decision. If the claim is denied (in full or in part), the claimant will be provided a written notice explaining the specific reasons for the denial and referring to the provisions of this Plan on which the denial is based. The notice also will include a statement that the claimant will be provided, upon request and free of charge, reasonable access to, and copies of, all documents and other information relevant to the claim and a statement regarding the claimant's right to bring an action under Section 502(a) of ERISA.

16. **Attorneys' Fees**. The parties shall each bear their own expenses, legal fees and other fees incurred in connection with this Plan. Provided, however, in the event that an Eligible Employee is required to incur attorneys' fees in order to obtain any payments or benefits under this Plan, and provided that the Eligible Employee prevails on at least one material issue related to his or her claim(s) under this Plan, then the Company will reimburse the attorneys' fees incurred by the Eligible Employee. The reimbursements will be made in accordance with the Company's normal reimbursement policies following final adjudication of the Eligible Employee's claims, provided however, that (a) the reimbursements are payable only during the Eligible Employee's lifetime, (b) the reimbursements will be made on or before the last day of the Eligible Employee's taxable year following the taxable year in which the expenses were incurred, (c) the right to reimbursement, if any, is not subject to liquidation or exchange for another benefit, and (d) the amount of expenses eligible for reimbursement during an Eligible Employee's taxable year will not affect the expenses eligible for reimbursement to be provided in any other taxable year.

17.**Source of Payments**. All Severance Benefits, other than Equity Award acceleration, will be paid in cash from the general funds of the Company; no separate fund will be established

under this Plan, and this Plan will have no assets. No right of any person to receive any payment under this Plan will be any greater than the right of any other general unsecured creditor of the Company.

18. **Inalienability**. In no event may any current or former employee of the Company or any of its subsidiaries or affiliates sell, transfer, anticipate, assign or otherwise dispose of any right or interest under this Plan. At no time will any such right or interest be subject to the claims of creditors nor liable to attachment, execution or other legal process.

19. **No Enlargement of Employment Rights**. Neither the establishment or maintenance or amendment of this Plan, nor the making of any benefit payment hereunder, will be construed to confer upon any individual any right to continue to be an employee of the Company. The Company expressly reserves the right to discharge any of its employees at any time, with or without cause. However, as described in this Plan, an Eligible Employee may be entitled to benefits under this Plan depending upon the circumstances of his or her termination of employment.

20. **Successors**. Any successor to the Company of all or substantially all of the Company's business and/or assets (whether direct or indirect and whether by purchase, merger, consolidation, liquidation or other transaction) will assume the obligations under this Plan and agree expressly to perform the obligations under this Plan in the same manner and to the same extent as the Company would be required to perform such obligations in the absence of a succession. For all purposes under this Plan, the term "Company" will include any successor to the Company's business and/or assets which become bound by the terms of this Plan by operation of law, or otherwise.

21. **Applicable Law**. The provisions of this Plan will be construed, administered and enforced in accordance with ERISA and, to the extent applicable, the internal substantive laws of the State of Washington (but not its conflict of laws provisions).

22. **Severability**. If any provision of this Plan is held invalid or unenforceable, its invalidity or unenforceability will not affect any other provision of this Plan, and this Plan will be construed and enforced as if such provision had not been included.

23. **Headings**. Headings in this Plan document are for purposes of reference only and will not limit or otherwise affect the meaning hereof.

24. **Indemnification**. The Company hereby agrees to indemnify and hold harmless the officers and employees of the Company, and the members of its Board, from all losses, claims, costs or other liabilities arising from their acts or omissions in connection with the administration, amendment or termination of this Plan, to the maximum extent permitted by applicable law. This indemnity will cover all such liabilities, including judgments, settlements and costs of defense. The Company will provide this indemnity from its own funds to the extent that insurance does not cover such liabilities. This indemnity is in addition to and not in lieu of any other indemnity provided to such person by the Company.

25. **Statement of ERISA Rights**.

As an Eligible Employee under this Plan, you have certain rights and protections under ERISA. ERISA provides that all Plan participants are entitled to:

(a) Examine (without charge) all Plan documents, including any

amendments and copies of all documents filed with the U.S. Department of Labor. These documents are available for your review at the Company's headquarters.

(b) Obtain, upon written request to the Administrator, copies of documents governing the operation of the Plan, including collective bargaining agreements, if any, and copies of the latest annual report (Form 5500 Series) and summary plan description. A reasonable charge may be made for such copies.

In addition to creating rights for Eligible Employees, ERISA imposes duties upon the people who are responsible for the operation of this Plan. The people who operate this Plan (called "fiduciaries") have a duty to do so prudently and in the interests of you and the other Eligible Employees. No one, including the Company or any other person, may fire you or otherwise discriminate against you in any way to prevent you from obtaining a benefit under this Plan or exercising your rights under ERISA. If your claim for a severance benefit is denied, in whole or in part, you must receive a written explanation of the reason for the denial. You have the right to have the denial of your claim reviewed. (The claim review procedure is explained in Section 15 above.)

Under ERISA, there are steps you can take to enforce the above rights. For example, if you request materials and do not receive them within thirty (30) days, you may file suit in a Federal court. In such a case, the court may require the Administrator to provide the materials and to pay you up to $110 a day until you receive the materials, unless the materials were not sent due to reasons beyond the control of the Administrator. If you have a claim for benefits, which is denied or ignored, in whole or in part, you may file suit in a Federal court. If it should happen that you are discriminated against for asserting your rights, you may seek assistance from the U.S. Department of Labor, or you may file suit in a Federal court. In any case, the court will decide who will pay court costs and legal fees. If you are successful, the court may order the person you have sued to pay these costs and fees. If you lose, the court may order you to pay these costs and fees, for example, if it finds that your claim is frivolous.

If you have any questions regarding this Plan, please contact the Administrator. If you have any questions about this statement or about your rights under ERISA, you may contact the nearest area office of the Employee Benefits Security Administration, U.S. Department of Labor, listed in your telephone directory, or the Division of Technical Assistance and Inquiries, Employee Benefits Security Administration, U.S. Department of Labor, 200 Constitution Avenue, N.W. Washington, D.C. 20210. You also may obtain certain publications about your rights and responsibilities under ERISA by calling the publications hotline of the Employee Benefits Security Administration.

26. **Additional Information**.

Plan Name:	Sana Biotechnology, Inc. Change in Control Severance Plan
Plan Sponsor and Plan Administrator:	Board of Directors Sana Biotechnology, Inc. 188. E. Blaine St #400 Seattle, WA 98102 Tel: 206-701-7914
Type of Administration:	Self-Administered

Type of Plan:	Severance Pay Employee Welfare Benefit Plan
Employer Identification Number:	83-1381173
Agent for Service of Legal Process:	Sana Biotechnology, Inc. Attn: General Counsel 188. E. Blaine St #400 Seattle, WA 98102 Tel: 206-701-7914
Plan Year:	January 1-December 31
Plan Number:	501

Exhibit 10.16(b)

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED PURSUANT TO ITEM 601(B)(10)(IV) OF REGULATION S-K BECAUSE IT IS BOTH (I) NOT MATERIAL AND (II) THE TYPE OF INFORMATION THAT THE REGISTRANT TREATS AS PRIVATE OR CONFIDENTIAL.

FIRST AMENDMENT TO THE EXCLUSIVE LICENSE AGREEMENT

UC Control Number [***]

This First Amendment (the "**First Amendment**") is made effective **May 21, 2021** (the **"First Amendment's Effective Date**"), by and between **The Regents of the University of California**, a California public corporation, having its statewide administrative offices at [***] ("**The Regents**"), acting through The Technology Development Group of the University of California, Los Angeles ("**UCLA**"), located at [***], and **Sana Biotechnology, Inc.** ("**Licensee**"), a Delaware Corporation having its principal place of business at 188 E. Blaine St., Suite 400, Seattle WA 98102, and amends the license agreement with Licensee, dated March 01, 2019 with UC Agreement Control Number [***] (the "**Agreement**").

RECITALS

WHEREAS, Licensee wishes to amend the development milestone and timeline set forth in Section 6.2A of the Agreement and The Regents is willing to grant an extension of the development milestone and timeline set forth in Section 6.2A of the Agreement due to effects of the COVID-19 pandemic; and

NOW THEREFORE, in consideration of the foregoing premises and the mutual promises, covenants, and agreements hereinafter set forth, all parties to this Second Amendment mutually agree to amend the Agreement as follows:

1. Delete and replace the first Development Milestone, i.e., Section 6.2.A, with the following:

"A. [***]"

All other terms and conditions of the Agreement remain the same. This First Amendment may be executed in two or more counterparts, each of which shall be deemed an original but all of which together shall constitute one and the same instrument. Facsimile, Portable Document Format (PDF) or photocopied signatures of the Parties will have the same legal validity as original signatures.

IN WITNESS WHEREOF, both The Regents and Licensee have executed this amendment by their respective and duly authorized officers on the dates indicated below.

SANA BIOTECHNOLOGY, INC.	**THE REGENTS OF THE UNIVERSITY OF CALIFORNIA**
By: /s/ Christian Hordo	By: /s/ Mark A. Wisniewski
Name: Christian Hordo	Name: Mark A. Wisniewski
Title: Chief Business Officer	Title: Sr. Director, Bio Pharmaceuticals
Date: 06/11/2021	Date: 06/11/2021

THE REGENTS OF THE UNIVERITY OF CALIFORNIA

By: /s/ Amir Naiberg

Name: Amir Naiberg

Title: AVC Technology Development Group

Date: 06/11/21

Exhibit 10.21(b)

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED PURSUANT TO ITEM 601(B)(10)(IV) OF REGULATION S-K BECAUSE IT IS BOTH (I) NOT MATERIAL AND (II) THE TYPE OF INFORMATION THAT THE REGISTRANT TREATS AS PRIVATE OR CONFIDENTIAL.

AMENDMENT NO. 1 TO AMENDED AND RESTATED EXCLUSIVE PATENT LICENSE AGREEMENT

THIS AMENDMENT NO. 1 ("Amendment No. 1"), with an effective date of December 30, 2022 ("Amendment No. 1 Effective Date"), is entered into by and between Sana Biotechnology, Inc. ("Company") and University of Rochester ("University").

WHEREAS, University and Sana entered into that certain Amendment and Restated Exclusive Patent License Agreement effective as of September 10, 2020 (the "Original Agreement");

WHEREAS, by this Amendment No. 1, the Parties wish to amend the Original Agreement, as set forth in Section 2 herein, to amend the achievement dates for the Benchmarks set forth in Appendix C;

WHEREAS, the Parties desire that all other terms and conditions of the Original Agreement remain in full force and effect;

NOW, THEREFORE, COMPANY and UNIVERSITY hereby agree as follows:

1. Capitalized terms used in this Amendment No. 1 shall have the same meaning as those in the Original Agreement unless specifically defined otherwise in this Amendment No. 1. All article and section references shall refer to the corresponding Article and Section in the Original Agreement the Prior Amendments. All references to the "Agreement" in the Original Agreement and this Amendment No. 1 shall mean the Original Agreement as amended hereby.

2. Amendment

2.1 Appendix C. The first four bullets of Appendix C to the Agreement are hereby deleted and replaced in their entirety by the following:

[***]

4. Miscellaneous.

4.1 Effect and Interpretation. This Amendment No. 1 shall be effective for all purposes as of the Amendment No. 1 Effective Date. To the extent that there are any inconsistencies between this Amendment No. 1 and the Original Agreement and the Prior Amendments, the terms of this Amendment No. 1 shall supersede those set forth in the Original Agreement the Prior Amendments. Except as otherwise expressly modified by this Amendment No. 1, the Original Agreement and the Prior Amendments shall remain in full force and effect in accordance with their terms. As of the Amendment No. 1 Effective Date, the term "Agreement" (as used herein and in the Original Agreement and the Prior Amendments) shall mean the Original Agreement and the Prior Amendments as amended by this Amendment No. 1.

4.2 Counterparts. This Amendment No. 1 may be executed in one or more counterparts by original, facsimile or PDF signature, each of which shall be deemed to be an original, but all of which together shall constitute one and the same instrument.

IN WITNESS WHEREOF, COMPANY and UNIVERSITY have caused this Amendment No. 1 to be executed by their respective duly authorized representatives as of the Amendment No. 1 Effective Date.

SANA BIOTECHNOLOGY, INC. **UNIVERSITY OF ROCHESTER**

By:	/s/ Christian Hordo	By:	/s/ Harl Tolbert
Name:	Christian Hordo	Name:	Harl Tolbert
Title:	Chief Business Officer	Title:	Associate Vice President
Date:	April 3, 2023	Date:	April 3, 2023

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement, as amended, (Form S-3 No. 333-266547) of Sana Biotechnology, Inc.,

(2) Registration Statement (Form S-8 No. 333-252862) pertaining to the Sana Biotechnology, Inc. 2018 Equity Incentive Plan, 2021 Incentive Award Plan, and 2021 Employee Stock Purchase Plan,

(3) Registration Statement (Form S-8 No. 333-258302) pertaining to the Sana Biotechnology, Inc. Restricted Stock Unit Plan, and

(4) Registration Statement (Form S-8 No. 333-264846) pertaining to the Sana Biotechnology, Inc. 2021 Incentive Award Plan and 2021 Employee Stock Purchase Plan

of our report dated March 16, 2023, with respect to the consolidated financial statements of Sana Biotechnology, Inc. included in this Annual Report (Form 10-K) of Sana Biotechnology, Inc. for the year ended December 31, 2022.

/s/ Ernst & Young LLP

Seattle, Washington
February 29, 2024

Exhibit 31.1

Certification of President and Chief Executive Officer
Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

I, Steven D. Harr, M.D., certify that:

1. I have reviewed this annual report on Form 10-K of Sana Biotechnology, 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 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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) 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. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c. 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

d. 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 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: February 29, 2024

By: /s/ Steven D. Harr, M.D.
Steven D. Harr, M.D.
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

Certification of Chief Financial Officer
Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

I, Nathan Hardy, certify that:

1. I have reviewed this annual report on Form 10-K of Sana Biotechnology, 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 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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) 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. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c. 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

d. 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 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: February 29, 2024

By: /s/ Nathan Hardy
Nathan Hardy
Chief Financial Officer
(Principal Financial and Accounting 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 Sana Biotechnology, Inc. (the "Company") for the period ended December 31, 2023, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Steven D. Harr, M.D., President and Chief Executive Officer of the Company, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

(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 results of operations of the Company.

Date: February 29, 2024

/s/ Steven D. Harr, M.D.
Steven D. Harr, M.D.
President and Chief Executive Officer
(Principal Executive Officer)

A signed original of this written statement required by Section 906 of the Sarbanes-Oxley Act of 2002 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Report to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Sana Biotechnology, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Report), irrespective of any general incorporation language contained in such filing.

Exhibit 32.2

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 Sana Biotechnology, Inc. (the "Company") for the period ended December 31, 2023, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Nathan Hardy, Chief Financial Officer of the Company, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

(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 results of operations of the Company.

Date: February 29, 2024

/s/ Nathan Hardy
Nathan Hardy
Chief Financial Officer
(Principal Financial and Accounting Officer)

A signed original of this written statement required by Section 906 of the Sarbanes-Oxley Act of 2002 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Report to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Sana Biotechnology, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Report), irrespective of any general incorporation language contained in such filing.

Exhibit 97.1

SANA BIOTECHNOLOGY, INC.

COMPENSATION RECOVERY POLICY

Adopted as of October 24, 2023

1. Overview

Sana Biotechnology, Inc., a Delaware corporation ("Sana"), has adopted this Compensation Recovery Policy (this "Policy") to set forth the circumstances and procedures under which Sana shall recover Erroneously Awarded Compensation from Covered Persons (each as defined below) in accordance with rules issued by the United States Securities and Exchange Commission (the "SEC") under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and the Nasdaq Stock Market.

2. Definitions

a. "Applicable Recovery Period" means the three completed fiscal years immediately preceding the Restatement Date for a Financial Restatement. In addition, in the event Sana has changed its fiscal year: (i) any transition period of less than nine months occurring within or immediately following such three completed fiscal years shall also be part of such Applicable Recovery Period and (ii) any transition period of nine to 12 months will be deemed to be a completed fiscal year.

b. "Applicable Rules" means Section 10D of the Exchange Act, Rule 10D-1 promulgated thereunder, any rules or regulations adopted by the Exchange pursuant to Rule 10D-1, and any applicable rules, regulations, standards, or other guidance adopted by the SEC or the Exchange.

c. "Board" means the Board of Directors of Sana.

d. "Committee" means the Compensation and Talent Committee of the Board.

e. "Covered Person" means any Executive Officer. A person's status as a Covered Person with respect to Erroneously Awarded Compensation shall be determined as of the time of receipt of such Erroneously Awarded Compensation regardless of the person's current role or status at Sana (e.g., if a person began service as an Executive Officer after the beginning of an Applicable Recovery Period, that person would not be considered a Covered Person with respect to Erroneously Awarded Compensation received before the person began service as an Executive Officer, but would be considered a Covered Person with respect to Erroneously Awarded Compensation received after the person began service as an Executive Officer where such person served as an Executive Officer at any time during the performance period for such Erroneously Awarded Compensation).

f. "Effective Date" means October 24, 2023.

g. "Erroneously Awarded Compensation" means the amount of any Incentive-Based Compensation received by a Covered Person on or after the Effective Date and during

the Applicable Recovery Period that exceeds the amount that otherwise would have been received by the Covered Person had such compensation been determined based on a restated Financial Reporting Measure based on a Financial Restatement, computed on a pre-tax basis in accordance with the Applicable Rules. Calculation of Erroneously Awarded Compensation with respect to Incentive-Based Compensation based on stock price or total shareholder return, where the amount of Erroneously Awarded Compensation is not subject to mathematical recalculation directly from the information in a Financial Restatement, shall be based on a reasonable estimate of the effect of the Financial Restatement on the stock price or total shareholder return upon which the Incentive-Based Compensation was received, and Sana shall maintain documentation of the determination of such reasonable estimate and provide such documentation to the Exchange in accordance with the Applicable Rules.

h. "Exchange" means the Nasdaq Stock Market LLC.

i. "Executive Officer" means any person who served as an executive officer, as defined in Rule 10D-1(d) under the Exchange Act, of Sana at any time during the performance period for the applicable Incentive-Based Compensation.

j. "Financial Reporting Measure" means any measure determined and presented in accordance with the accounting principles used in preparing Sana's financial statements, any measure derived wholly or in part from such measures (including, for example, GAAP, IFRS, and a non-GAAP/IFRS financial measures), and stock price and total stockholder return.

k. "GAAP" means United States generally accepted accounting principles.

l. "IFRS" means international financial reporting standards as adopted by the International Accounting Standards Board.

m. "Impracticable" means (a) the direct costs paid to third parties to assist in enforcing recovery, including outside legal counsel, would exceed the Erroneously Awarded Compensation, provided that Sana (i) has made reasonable attempts to recover the Erroneously Awarded Compensation, (ii) documented such attempt(s), and (iii) provided such documentation to the Exchange; (b) to the extent permitted by the Applicable Rules, the recovery would violate Sana's home country laws pursuant to an opinion of home country counsel, provided that Sana has (i) obtained an opinion of home country counsel, acceptable to the Exchange, that recovery would result in such violation, and (ii) provided such opinion to Exchange; or (c) recovery would likely cause an otherwise tax-qualified retirement plan, under which benefits are broadly available to employees of Sana, to fail to meet the requirements of 26 U.S.C. 401(a)(13) or 26 U.S.C. 411(a) and the regulations thereunder.

n. "Incentive-Based Compensation" means any compensation provided, directly or indirectly, by Sana or any of its affiliates that is granted, earned, or vested based, in whole or in part, upon the attainment of a Financial Reporting Measure and that is received by an Executive Officer after beginning service as an Executive Officer and while Sana has a class of securities listed on the Exchange. Incentive-Based

Compensation shall be deemed received on the date determined in accordance with the Applicable Rules, which generally provide that Incentive-Based Compensation is deemed received, earned, or vested when the Financial Reporting Measure is attained, not when the actual payment, grant, or vesting occurs, and without regard to whether the payment, grant, or vesting occurs after the end of a person's service as an Executive Officer.

o. "Other Recovery Arrangements" means, other than the compensation recovery provided for under this Policy, any other clawback, recoupment, forfeiture, or similar policies or provisions of Sana or its affiliates, including any such policies or provisions of such effect contained in any employment agreement, bonus plan, incentive plan, equity-based plan or award agreement thereunder or similar plan, program, or agreement of Sana or an affiliate or required under applicable law.

p. "Financial Restatement" means a restatement of Sana's previously-issued financial statements to correct Sana's material noncompliance with any financial reporting requirement under the securities laws, including any required restatement to correct an error in previously-issued financial statements that is material to the previously-issued financial statements or that would result in a material misstatement if the error were corrected in the current period or left uncorrected in the current period.

q. "Restatement Date" means, with respect to a Financial Restatement, the earlier to occur of: (i) the date the Board concludes, or reasonably should have concluded, that Sana is required to prepare the Financial Restatement or (ii) the date a court, regulator, or other legally authorized body directs Sana to prepare the Financial Restatement.

3. Compensation Recovery Requirement

In the event Sana is required to prepare a Financial Restatement, Sana shall recover reasonably promptly all Erroneously Awarded Compensation with respect to such Financial Restatement, unless the Committee has determined that recovery would be Impracticable. Recovery shall be required in accordance with the preceding sentence regardless of whether the applicable Covered Person engaged in misconduct or otherwise caused or contributed to the requirement for the Financial Restatement and regardless of whether or when restated financial statements are filed by Sana. For clarity, the recovery of Erroneously Awarded Compensation under this Policy will not give rise to any person's right to voluntarily terminate employment for "good reason," or due to a "constructive termination" (or any similar term of like effect) under any plan, program, or policy of or agreement with Sana or any of its affiliates.

4. Method of Recovery; Limitation on Duplicative Recovery

The Committee shall determine, in its sole discretion, the method for recovering Erroneously Awarded Compensation hereunder, which may include, without limitation, any one or more of the following, to the extent permitted by applicable law:

a. reimbursement of cash Incentive-Based Compensation previously paid;

b. recovery of any gain realized on the vesting, exercise, settlement, sale, transfer, or other disposition of any equity-based awards;

c. cancelling, reduction, or rescinding some or all outstanding vested or unvested equity-based awards;

d. adjusting or withholding from unpaid compensation or other set-off;

e. cancelling or offsetting against planned future grants of equity-based awards; and/or

f. any other method permitted by applicable law or contract.

Notwithstanding the foregoing, a Covered Person will be deemed to have satisfied such Covered Person's obligation to return Erroneously Awarded Compensation to Sana if such Erroneously Awarded Compensation is returned in the exact same form in which it was received; provided that equity withheld to satisfy tax obligations will be deemed to have been received in cash in an amount equal to the tax withholding payment made.

Further notwithstanding the foregoing, unless otherwise prohibited by the Applicable Rules, to the extent this Policy provides for recovery of Erroneously Awarded Compensation already recovered by Sana pursuant to Sarbanes-Oxley Act Section 304 or Other Recovery Arrangements, the amount of Erroneously Awarded Compensation already recovered by Sana from the applicable Covered Person may be credited toward the amount of Erroneously Awarded Compensation required to be recovered from such Covered Person pursuant to this Policy.

5. No Indemnification; No Liability

Notwithstanding anything to the contrary set forth in any agreement with, or the organizational documents of, Sana or any of its affiliates, Covered Persons are not entitled to (i) indemnification for Erroneously Awarded Compensation or for any losses arising out of or in any way related to Erroneously Awarded Compensation to be recovered under this Policy, or (ii) payment or reimbursement, directly or indirectly, for any premiums for third-party insurance policies that a Covered Person may elect to purchase to fund such Covered Person's potential obligations under this Policy. None of Sana, its affiliates, or any member of the Board shall have any liability to any person as a result of actions taken pursuant to this Policy.

6. Interpretation

This Policy shall be interpreted in a manner that is consistent with the Applicable Rules and any other applicable law. The Committee shall take into consideration any applicable interpretations and guidance of the SEC in interpreting this Policy, including, for example, in determining whether a financial restatement qualifies as a Financial Restatement hereunder. To the extent any provision of this Policy is inconsistent with, or otherwise unenforceable or invalid under, the Applicable Rules or other applicable law, it shall be deemed amended in a manner consistent with its objectives to the minimum extent necessary to ensure compliance therewith. This Policy will not apply to the extent Sana does not have a class of securities listed on the Exchange.

To the extent the Applicable Rules require recovery of Incentive-Based Compensation in additional circumstances besides those specified above, nothing in this Policy shall be deemed to limit or restrict the right or obligation of Sana to recover Incentive-Based Compensation to the fullest extent required by the Applicable Rules. Except as otherwise determined by the Committee or the Board, the adoption of this Policy does not limit, and is intended to apply in addition to, Other Recovery Arrangements. The provisions, including any remedies described in, this Policy shall not be exclusive and shall be in addition to every other right or remedy at law or in equity that may be available to Sana or its affiliates.

7. Administration

This Policy shall be administered, interpreted, and construed by the Committee, which is authorized to make all determinations necessary, appropriate, or advisable for such purpose consistent with Sana's governing documents and applicable law. The Board may re-vest in itself the authority to administer, interpret, and construe this Policy in accordance with applicable law, and in such event references herein to the "Committee" shall be deemed to be references to the Board. Subject to any permitted review by the Exchange pursuant to the Applicable Rules, all determinations and decisions made by the Committee pursuant to the provisions of this Policy shall be final, conclusive and binding on all persons, including Sana and its affiliates, stockholders and employees. The Committee may delegate administrative duties with respect to this Policy to one or more directors or employees of Sana, as permitted under applicable law, including any Applicable Rules.

Notwithstanding the foregoing, the Board shall have exclusive authority to authorize Sana to prepare a Financial Restatement. In doing so, the Board may rely on a recommendation of the Audit Committee of the Board.

The Board may amend, modify, or terminate this Policy in whole or in part at any time and from time to time in its sole discretion.