Table of Contents

Table of Contents

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

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2020

OR

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

For the transition period from _____ to _____

Commission file number: 001-38541

Magenta Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**81-0724163**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification Number)**
100 Technology Square Cambridge, Massachusetts **(Address of principal executive offices)**	**02139** **(Zip Code)**

(857) 242-0170
(Registrant's telephone number, including area code)

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, $0.001 Par Value	**MGTA**	**The Nasdaq Global Market**

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

None

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 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, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

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

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

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

The aggregate market value of Common Stock held by non-affiliates of the registrant computed by reference to the price of the registrant's Common Stock as of June 30, 2020, the last business day of the registrant's most recently completed second fiscal quarter, was approximately $246.4 million (based on the last reported sale price on the Nasdaq Global Market as of such date). For this computation, the registrant has excluded the market value of all shares of Common Stock reported as beneficially owned by its executive officer and directors; such exclusion shall not be deemed to constitute an admission that any such person is an affiliate of the registrant.

As of January 31, 2021, there were 48,556,135 shares of the registrant's Common Stock, $0.001 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for its 2021 Annual Meeting of Stockholders, which the registrant intends to file with the Securities and Exchange Commission not later than 120 days after the registrant's fiscal year ended December 31, 2020, are incorporated by reference into Part III of this Annual Report on Form 10-K.

Magenta Therapeutics, Inc.
Index

FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K of Magenta Therapeutics, Inc. (the "Company") contains or incorporates statements that constitute forward-looking statements within the meaning of the federal securities laws. Any express or implied statements that do not relate to historical or current facts or matters are forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as "may," "will," "could," "should," "expects," "intends," "plans," "anticipates," "believes," "estimates," "predicts," "projects," "seeks," "endeavor," "potential," "continue" or the negative of these terms or other comparable terminology. Forward-looking statements appear in a number of places in this Annual Report on Form 10-K and include, but are not limited to, statements about:

- the timing and the success of clinical trials of MGTA-145 and any other product candidates;
- the outcomes of our preclinical studies, including of MGTA-117;
- our ability to enroll patients in our clinical trials at the pace that we project;
- whether the results of our trials will be sufficient to support domestic or foreign regulatory approvals for MGTA-145 or any other product candidates we may develop;
- our ability to establish clinical programs moving forward in multiple indications, with a rapidly advancing portfolio and sustainable platform;
- regulatory actions with respect to our product candidates or our competitors' products and product candidates;
- our ability to obtain, including on an expedited basis, and maintain regulatory approval of MGTA-145 or any other product candidates we may develop;
- the level of expenses related to any of our product candidates or clinical development programs;
- our expectation that our existing capital resources will be sufficient to enable us to fund our planned development of MGTA-145 and any other product candidates we may identify and pursue;
- the benefits of the use of MGTA-145 or any other product candidate, if approved;
- our ability to successfully commercialize MGTA-145 or any other product candidates we may identify and pursue, if approved;
- our ability to successfully find collaborators for E478 or any of our current and future programs and product candidates;
- the rate and degree of market acceptance of MGTA-145 or any other product candidates we may identify and pursue;
- our ability to obtain orphan drug designation for any of our product candidates we may identify and pursue;
- our expectations regarding government and third-party payor coverage and reimbursement;
- our ability to manufacture MGTA-145 or any other product candidate in conformity with the U.S. Food and Drug Administration's requirements and to scale up manufacturing of our product candidates to commercial scale, if approved;
- our ability to successfully build a specialty sales force and commercial infrastructure;
- our ability to compete with companies currently producing or engaged in the clinical development of treatments for the disease indications that we pursue and treatment modalities that we develop;
- our reliance on third parties to conduct our clinical trials;
- our reliance on third-party contract manufacturers to manufacture and supply our product candidates for us;

- our ability to retain and recruit key personnel;
- our ability to obtain and maintain intellectual property protection for MGTA-145 or any other product candidates we may identify and pursue;
- our estimates of our expenses, ongoing losses, future revenue, capital requirements and our needs for or ability to obtain additional financing;
- our expectations regarding the time during which we will continue to be an emerging growth company or smaller reporting company as defined in federal securities regulations;
- our financial performance; and
- developments and projections relating to our competitors or our industry.

Although we believe that the expectations reflected in these forward-looking statements are reasonable, these statements relate to our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans, objectives of management and expected market growth, and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. You are urged to carefully review the disclosures we make concerning these risks and other factors that may affect our business and operating results under "Item 1A. Risk Factors" in this Annual Report on Form 10-K, as well as our other reports filed with the Securities and Exchange Commission (the "SEC"). Any public statements or disclosures by us following this Annual Report on Form 10-K that modify or impact any of the forward-looking statements contained in this Annual Report on Form 10-K will be deemed to modify or supersede such statements in this Annual Report on Form 10-K. You are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date of this document. The Company does not intend, and undertakes no obligation, to update any forward-looking information to reflect events or circumstances after the date of this document or to reflect the occurrence of unanticipated events, unless required by law to do so.

RISK FACTOR SUMMARY

The risk factors detailed in Item 1A entitled "Risk Factors" in this Annual Report on Form 10-K are the risks that we believe are material to our investors and a reader should carefully consider them. Those risks are not all of the risks we face and other factors not presently known to us or that we currently believe are immaterial may also affect our business if they occur. The following is a summary of the risk factors detailed in Item 1A:

- The novel coronavirus, or COVID-19, pandemic has caused, and could continue to cause, severe disruption in the U.S., regional and global economies and could seriously harm our development efforts, increase our costs and expenses and have a material adverse effect on our employees, business, financial condition and results of operations.
- We are a clinical stage company with a limited operating history, have incurred significant losses since our inception, and anticipate that we will continue to incur significant losses for the foreseeable future.
- We have no products approved for commercial sale and have not generated any revenue from product sales. If we are unable to raise additional capital when needed or on terms acceptable to us, we could be forced to significantly delay, scale back or discontinue our development or commercialization efforts.
- Although we have initiated and conducted clinical trials for some of our product candidates, including MGTA-145, we have not yet demonstrated the ability to successfully advance our clinical trials for our product candidates through the final regulatory processes and obtain marketing approvals for such products. Similarly, we have not yet demonstrated an ability to manufacture a commercial-scale drug product or conduct sales and marketing activities necessary for successful commercialization. If we are unable to obtain regulatory approval for MGTA-145 or any other product candidates that we may identify or develop, our business will be substantially harmed.

- The results of earlier studies may not be predictive of future clinical trial results, and we may fail to establish an adequate safety or efficacy profile to conduct advanced clinical trials or obtain regulatory approval for MGTA-145 or any other product candidates that we may pursue.
- Stem cell transplant is a high-risk procedure that may result in complications or adverse events for patients in our clinical trials or for patients that use any of our product candidates, if approved. If serious adverse events, undesirable side effects, or unexpected characteristics are identified during the development of any of our product candidates, we may need to limit, delay or abandon our further clinical development of those product candidates, even if such events, effects or characteristics were the result of stem cell transplant or related procedures generally, and not directly or specifically caused or exacerbated by our product candidates.
- If we are not able to identify a safe and effective dose for any of our antibody-drug conjugates, or ADCs, we may need to delay, abandon or limit our development of any potential product candidates.
- If we are unable to successfully develop our current programs into a comprehensive portfolio of product candidates, or experience significant delays in doing so, we may not realize the full commercial potential of our current and future product candidates.
- We are developing E478 specifically to partner with gene therapy and genome editing companies, and if we are unable to find willing collaborators, this may adversely affect the development of E478 and our business.
- The commercial success of any of our product candidates will depend upon the degree of market acceptance by physicians, patients, third-party payors and others in the medical community.
- We face substantial competition, including from companies with greater financial, technical, research, manufacturing, marketing, distribution and other resources than us, which may result in others discovering, developing or commercializing products before or more successfully than we do.
- We expect to continue to rely on third parties to manufacture our clinical product supplies, and we intend to rely on third parties to produce and process our product candidates, if approved.
- We have entered into collaborations and may enter into additional collaborations, strategic alliances or additional licensing arrangements in the future, and we may not realize the benefits of such collaborations, alliances or licensing arrangements.
- We are highly dependent on intellectual property licensed from third parties and termination of any of these licenses could result in the loss of significant rights, which would harm our business.
- It is difficult and costly to protect our intellectual property and our proprietary technologies, and we may not be able to ensure their protection. If we are unable to obtain and maintain sufficient intellectual property protection for MGTA-145, any of our other current or any future product candidates, or our technologies, we may not be able to compete effectively in our markets; and
- Our future success depends in part upon our ability to attract and retain highly skilled personnel, including the members of our executive team and key scientific and medical personnel employees.
- Changes in tax law could adversely affect our business and financial condition.

This section contains forward-looking statements. You should refer to the explanation of the qualifications and limitations on forward-looking statements beginning on page three.

PART I

Except where the context otherwise requires or where otherwise indicated, the terms "Magenta," "we," "us," "our," "our company," "the company," and "our business" refer to Magenta Therapeutics, Inc. and its consolidated subsidiary.

ITEM 1. BUSINESS

Overview

Magenta Therapeutics is a clinical-stage biotechnology company developing novel medicines to bring the curative power of stem cell transplants to more patients with blood cancers, genetic diseases and autoimmune diseases.

Magenta's drug development pipeline includes multiple product candidates designed to improve stem cell transplants. Our lead clinical program is designed to more efficiently and reliably mobilize and collect sufficient functional stem cells for use in stem cell transplantation, a process known as mobilization. We are also developing product candidates that are designed to deplete targeted cells in the bone marrow to make space for the bone marrow to receive newly transplanted stem cells, a process known as conditioning. Our mobilization program is intended to enable rapid, reliable, predictable and safe mobilization and collection of high numbers of functional stem cells for transplant. Magenta's targeted conditioning programs are intended to enhance the efficacy of and/or reduce the dosing levels, intensity or, in some cases, even the need for chemotoxic agents.

Stem cell transplant is an established and, for certain patients, can be a curative medical procedure that can reset a patient's blood and immune system after the patient has received treatment for certain blood cancers, genetic diseases or autoimmune diseases. Stem cell transplants involve a three-step process: (i) stem cells are mobilized out of the patient's or donor's bone marrow and collected from the blood (or, in rare cases, surgically extracted from their bone marrow); (ii) the patient's bone marrow is cleared of any remaining stem cells in order to make space to receive new transplanted stem cells; and (iii) the stem cells are transplanted into the patient via infusion where they fasten to, or engraft in, the bone marrow and grow into the blood cells and platelets that form the basis of a reset and rebuilt blood and immune system. All transplants are categorized as either autologous or allogeneic depending on the source of the new stem cells for the transplant. In an autologous transplant, the patient's own stem cells are used. In an allogeneic transplant, patients receive cells from a stem cell donor.

Stem cell transplant, whether autologous or allogeneic, has broad applicability across disease settings, including blood cancers, gene therapies for genetic diseases and autoimmune diseases. It is the current standard of care for certain blood cancers such as acute myeloid leukemia, or AML, myelodysplastic syndromes, or MDS, multiple myeloma and non-Hodgkin's lymphoma. Hematopoietic stem cell, or HSC, -based gene therapies also rely on the same steps of the stem cell transplant process with an additional step where collected stem cells are gene-corrected or modified to address the underlying disease prior to transplant. Such gene therapy approaches that leverage the stem cell transplant procedure are being investigated by numerous companies in a variety of diseases, including sickle cell disease, beta-thalassemia and lysosomal storage disorders. Autoimmune diseases such as multiple sclerosis and systemic sclerosis may also benefit from resetting the immune system through stem cell transplant.

Currently, the number of days required to mobilize and collect a patient's or donor's stem cells is a minimum of five days in blood cancer patients and healthy donors and as many as 30 days or more in patients with sickle cell disease. When planning for a patient's transplant, transplanting physicians cannot reliably predict at the outset how long it will take for patients to mobilize the number of cells required. Many patients require multiple collections, including approximately 40% of blood cancer patients and 75% of sickle cell disease patients. In addition, each day scheduled for attempted mobilization and collection can cause an accumulation of both the direct costs associated with the repeated use of mobilization agents and other healthcare resources,

including personnel time, and the indirect costs associated with the need to block time in the limited number of chairs in transplant centers that are used to collect stem cells. Similarly, HSC-based gene therapies could benefit from more efficient collection of stem cells which could potentially reduce gene therapy manufacturing timelines and costs. Additionally, there are no approved mobilization options for patients with sickle cell disease and autoimmune diseases, and the off-label use of currently available medicines is associated with significant safety risks including vaso-occlusive events in sickle cell disease patients.

Magenta is developing MGTA-145 for stem cell mobilization in a broad range of diseases, for both autologous and allogeneic transplants. MGTA-145 is Magenta's biologic stem cell mobilization product candidate designed to address these time and cost inefficiencies while enabling the rapid, reliable, predictable and safe collection of functional blood stem cells for transplant in a single day. In 2020, we completed a Phase 1 clinical trial in healthy volunteers to evaluate the ability of MGTA-145, in combination with plerixafor, to mobilize stem cells. Based on the results of the study, we have advanced the program into three ongoing and planned Phase 2 clinical trials, including an autologous transplant trial in multiple myeloma patients; an allogeneic transplant trial with healthy donor cells collected for transplant in patients with acute myeloid leukemia, myelodysplastic syndromes or acute lymphocytic leukemia, or ALL; and lastly, a planned trial in partnership with bluebird bio, Inc. to mobilize and collect the stem cells of sickle cell disease patients.

In addition to the opportunity to address the challenges in mobilization and collection of stem cells, Magenta also seeks to improve patient conditioning prior to transplant. Conditioning is the process by which patients are treated with chemotherapy prior to transplant to ensure that the bone marrow has sufficient space to receive newly transplanted stem cells. Currently, only approximately 50% of eligible patients receive a stem cell transplant, in part because of the risks and toxicities of the chemotherapeutic agents available today. Magenta's lead conditioning program, MGTA-117, is designed to selectively deplete stem cells and reduce the need for high-dose or high-intensity chemotherapeutic agents in oncology applications and potentially eliminate the use of busulfan in gene therapy applications. Our additional research-stage conditioning programs target stem and/or immune cells and are being designed to eliminate toxic chemotherapy conditioning regimens across multiple disease settings. Our C100 program focuses on addressing opportunities in immune reset for autoimmune diseases. Our C300 program is being designed to provide for lymphodepletion prior to cell therapies such as chimeric antigen receptor T cells, or CAR-T. Our G100 program is being designed to provide prophylaxis of graft-versus-host disease, a common post-transplant complication following allogeneic stem cell transplant.

Magenta is also evaluating two programs with potential in cell therapy. Each is a small molecule used to manufacture a high number of functional stem cells, from either a donor or gene-modified stem cells from a patient. MGTA-456 is a cell therapy designed to generate higher cell doses that are well matched to the patient, which has been shown to improve the speed and success of engraftment in stem cell transplant and improve disease outcomes. In June 2020, we announced that we discontinued enrollment in our Phase 2 trial of MGTA-456 in inherited metabolic diseases. Enrollment in an investigator-initiated trial in patients with blood cancers has been completed, and we plan to use these data, when available, to inform a decision regarding future program development in blood cancers. Our second cell therapy program, E478, is a small molecule aryl hydrocarbon receptor, or AHR, antagonist which uses the same mechanism used to manufacture MGTA-456 to expand gene-modified HSCs for stem cell-based gene therapy and genome editing.

Magenta intends to become a fully integrated discovery, development and commercial company in the field of stem cell transplant. We are developing our product candidates to be used individually or, in some cases, in combination with each other. As a result, our portfolio could be tailored to the patient's disease, such that a patient may receive more than one Magenta therapy as part of his or her individual stem cell transplant.

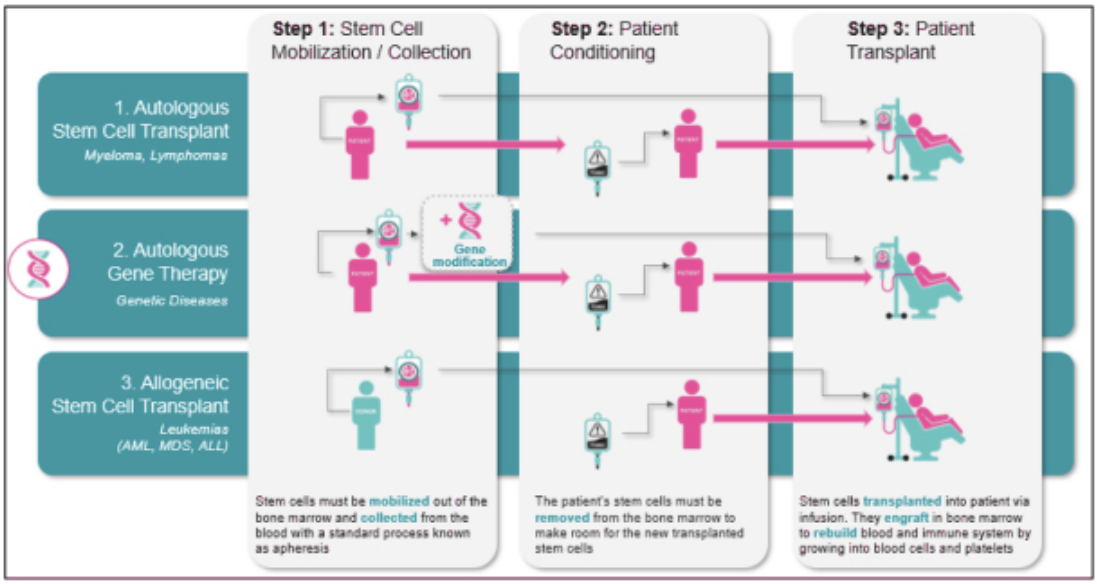
Our goal is to advance our product candidates through regulatory approval and bring them to the commercial market based on the data from our clinical trials and communications with regulatory agencies and payer communities. We expect to continue to advance our portfolio and innovate through our productive research platform.

Stem Cell Transplant: The Process and Current Opportunities

A stem cell transplant procedure involves three main steps: (i) stem cells from the patient's or donor's bone marrow are collected; (ii) the patient's bone marrow is cleared of any remaining stem cells in order to make space to receive new transplanted stem cells; and (iii) the stem cells are transplanted into the patient via infusion where they fasten to, or engraft in, the bone marrow and grow into the blood cells and platelets that form the basis of reset and rebuilt blood and immune systems. All transplants are categorized as either autologous or allogeneic, depending on the source of the new stem cells for the transplant.

In an autologous transplant—used for conditions such as multiple myeloma, non-Hodgkin's lymphoma and autoimmune diseases—the patient's own stem cells are used. In the case of stem cell gene therapy and genome editing, once the cells are collected from the patient, these cells are then modified to either insert a functioning gene into, or correct a defective gene within, the collected stem cells before they are transplanted into the patient via infusion.

In an allogeneic transplant—used for conditions such as acute leukemias and myelodysplastic syndromes—patients receive cells from a stem cell donor. The preferred source of stem cells for an allogeneic transplant is a donor from a biological relative who has a well-matched immune system. For patients without a matched related donor, the second option is a matched unrelated donor identified through a bone marrow donor registry. For patients without a matched related or unrelated donor, other options include mismatched donors, who can either be unrelated or related; however, transplant outcomes are not optimal with these donor types.



Our Strategy

Magenta's mission and culture are centered around the goal of enabling more patients with severe or life-threatening diseases to have access to the transformative benefit of stem cell transplant. We intend to provide transplant physicians with a tailored, multi-product treatment regimen based on the disease setting and the individual needs of patients. Our strategic priorities are as follows:

***Bring the curative power of blood and immune reset through stem cell transplant to all patients who can benefit by advancing an integrated product portfolio*:** We believe we are the only company that is committed to

addressing both mobilization and conditioning opportunities in stem cell transplant and HSC-based gene therapies. We are focused on creating a comprehensive portfolio of therapies to optimize the blood and immune reset process. Our initial focus is on blood cancers, genetic diseases and autoimmune diseases, and we also plan to address other diseases for which blood and immune reset could represent a one-time, curative treatment.

***Build on our deep expertise in stem cell biology to lead a new era in blood and immune reset through stem cell transplant*:** We have assembled a group of experts in the fields of stem cell biology, biotherapeutics and transplant medicine. With this team, we plan to convert recent scientific breakthroughs into a pipeline of product candidates for blood and immune reset therapies.

***Create a fully integrated patient-focused biotechnology company*:** We are building a fully integrated biotechnology company with end-to-end capabilities in research, development and commercialization, and we believe the broad and synergistic nature of our portfolio will allow us to address many of the significant limitations of stem cell transplant and transplant-based therapies.

***Commercialize our drug products to bring tailored blood and immune reset solutions to patients and physicians*:** Our commercial planning centers around hospital-based prescribers, and this is consistent across all product candidates in our portfolio. Stem cell transplants are performed in approximately 450 accredited medical centers in the U.S. and Europe, with more than half of the U.S. procedures performed at 20% of transplant centers. We have established relationships with key stakeholders within many of these top transplant centers. We believe the synergies among our programs and the well-defined structure of the current stem cell transplant provider network will allow us to commercialize our therapeutics through a focused, targeted commercial and medical affairs organization.

***Leverage MGTA-145 as our most advanced product candidate in the clinic and as a possible first commercial product for our portfolio*:** In addition to the potential to bring meaningful clinical benefit to patients, MGTA-145 provides strategic value to Magenta by allowing us to accelerate the build-out of our clinical development infrastructure and footprint and to establish key prescriber relationships that will be important for future commercialization of our products.

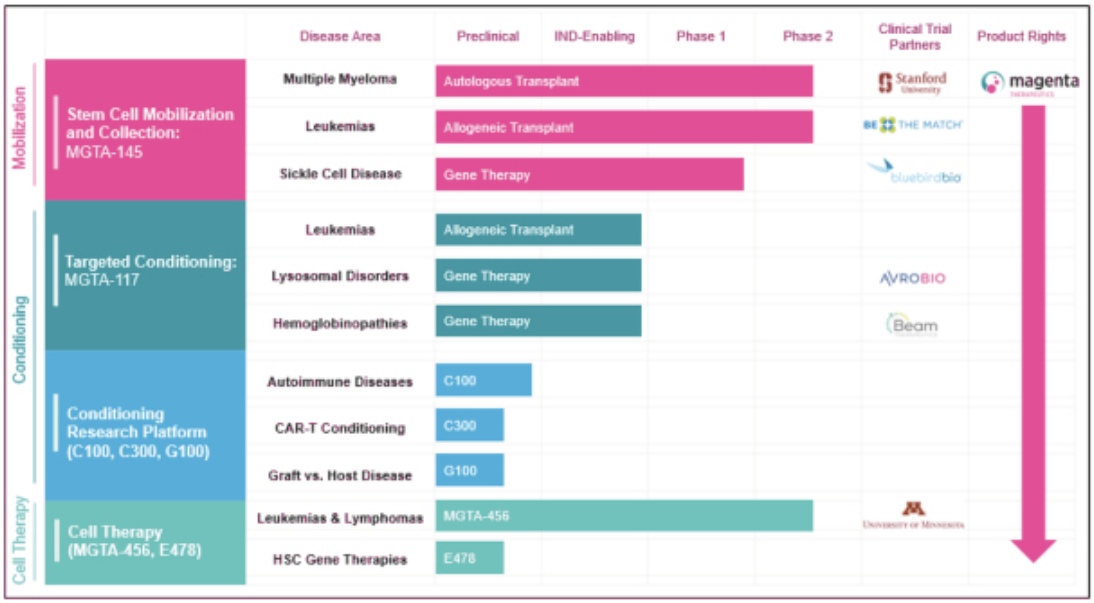
***Continue to integrate our innovative collaboration with National Marrow Donor Program/Be the Match with our science, medicine and business approaches*:** National Marrow Donor Program (as successor in interest to Be the Match Biotherapies, LLC), or Be the Match, is a leading patient-focused stem cell transplant organization in the U.S. Because of our shared patient focus, we and Be the Match established a broad, first-of-its-kind collaboration in 2017. This collaboration positions us as a partner with high-priority access to many services that will continue to enable us to establish relationships across transplant centers and with key transplant physicians. Through our partnership, we access clinical strategy support and clinical development operational support, including a cell supply platform which will enable our commercialization efforts across several programs. We also have access to the Be the Match payer and policy group to inform and support our pricing and reimbursement plans across the portfolio. In June 2020, we announced a clinical collaboration agreement with Be the Match, as an extension of our existing strategic partnership, to evaluate the potential utility of MGTA-145, in combination with plerixafor, for mobilizing and collecting HSCs from donors more efficiently and then using them for allogeneic transplants in patients.

***Strategically collaborate to realize the full potential of our portfolio*:** We own all product rights across our mobilization and conditioning programs, including MGTA-145 and MGTA-117. We will evaluate additional collaborations when available to:

- maximize the patient impact of our portfolio by finding value-creating partnerships to enable gene and cell therapies, including stem cell-based gene therapies, genome editing and CAR-T therapies;
- build relationships with partners to access complementary expertise and capabilities to bring our therapies as quickly as possible to all patients who can benefit; and
- opportunistically bring in preclinical or clinical assets that fit with our integrated portfolio.

Our Pipeline of Stem Cell Transplant Product Candidates

We are developing a portfolio of novel product candidates that we believe have the potential to meaningfully improve stem cell transplant for patients with blood cancers, genetic diseases and autoimmune diseases. Additionally, we believe our product candidates have the potential to allow more patients with debilitating or life-threatening diseases to access a one-time, transformative blood and immune reset through stem cell transplant with better outcomes and reduced risk of toxicities and mortality. We are developing our product candidates so that they can be used individually or in combination with each other, such that a patient may receive more than one Magenta therapy as part of his or her individual transplant journey. In addition to our first set of clinical product candidates, we are in the process of identifying several other potential candidates from our conditioning research platform.



We are applying our expertise in stem cell biology and biotherapeutics discovery to bring innovative product candidates to the stem cell transplant field through our programs, specifically designed to address each of the key opportunities in the stem cell transplant journey for patients:

- ***Stem Cell Mobilization & Collection Program***: Our MGTA-145 program is focused on enabling rapid, reliable, predictable and safe mobilization and collection of high numbers of functional blood stem cells for transplant.
- ***Targeted Conditioning Program***: Our MGTA-117 program is focused on selectively depleting stem cells from patients prior to transplant or HSC-based gene therapy to lessen the need for high-dose or high-intensity chemotherapeutic agents or, in the case of gene therapy applications, to potentially eliminate the need for chemotherapeutic agents altogether.
- ***Conditioning Research Platform:*** Our targeted conditioning research platform is designed to identify future product candidates that selectively deplete stem cells and/or immune cells from a patient prior to transplant or HSC-based gene therapy. These programs focus on developing targeted products that remove specific cell types, with an approach that is tailored to the patient's disease and transplant requirements.

Initial applications of our research-stage programs include immune reset for autoimmune diseases; lymphodepletion prior to cell therapies such as CAR-T; and prophylaxis of graft-versus-host disease, or GvHD, a post-transplant complication following allogeneic stem cell transplant.

- ***Cell Therapy Programs***: Our MGTA-456 program is focused on generating higher cell doses that are well matched to the patient, which has been shown to improve the speed and success of engraftment in stem cell transplant and improve disease outcomes. Our E478 program is designed to expand gene-modified HSCs for gene therapy and genome editing.

Stem Cell Mobilization & Collection Program

MGTA-145: A CXCR2 agonist biologic combined with plerixafor, a CXCR4 antagonist small molecule, as the preferred first-line mobilization regimen for rapid, reliable, predictable and safe mobilization and collection of functional stem cells for use in stem cell transplantation.

Opportunity

Once the patient and physician agree that stem cell transplant is the best treatment option, the source of stem cells must be identified and then the cells are collected. There are three methods of collecting stem cells from either patients or healthy donors for transplant:

- mobilization into the peripheral blood, which typically requires several days of injections of a drug or combination of drugs to mobilize the cells, or move them from the bone marrow into the bloodstream, where they are then collected through a process called apheresis;
- extraction from the bone marrow in a process known as bone marrow harvest, which requires a procedure performed under general anesthesia where cells are withdrawn directly from the bone marrow with needle aspirates; or
- harvesting from umbilical cord blood units, which are stored in cord blood banks.

Successful stem cell transplant requires collection of HSCs in both sufficient number and functionality, whether from the patient or a donor, to allow for robust engraftment and rebuilding of the blood and immune systems. Higher cell doses are associated with better outcomes and are especially important for gene therapy applications, which require processing of the stem cells following collection.

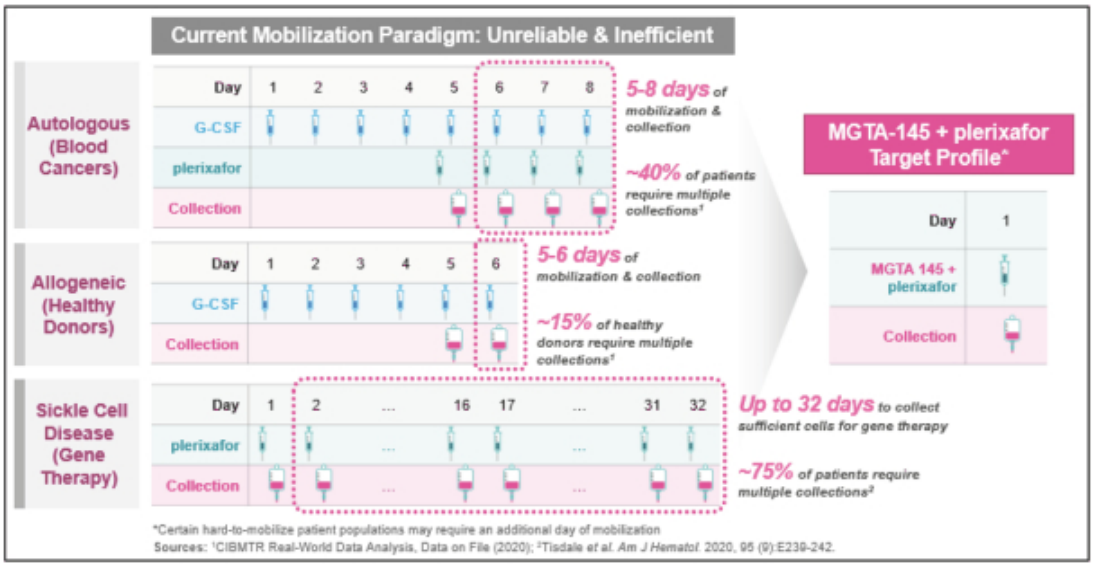
Mobilizing stem cells from the bone marrow to the blood has been shown to be an effective way to collect stem cells for transplant. Approximately 85% of the approximately 90,000 stem cell transplants performed globally each year use mobilized peripheral blood from either donors or patients as a source of stem cells.

The current standard of care for mobilization in most patients and donors is granulocyte colony-stimulating factor, or G-CSF, which mobilizes stem cells indirectly, requires repeated daily injections and is associated with significant side effects, including bone pain and, in some cases, splenic rupture and death. The multi-day regimen requires at least five days of injections of G-CSF, and side effects can be disruptive for both patients having their cells collected for autologous transplants and for healthy volunteers donating their cells for allogeneic transplants.

The current unreliable and inefficient mobilization and collection process can also pose a significant logistical burden on transplant and apheresis centers. When planning for a patient’s transplant, transplanting physicians cannot reliably predict at the outset how long it will take to collect the number of cells required. In addition, each day scheduled for attempted mobilization and collection can cause an accumulation of both the direct costs associated with the repeated use of mobilization agents and other healthcare resources, including personnel time, and the indirect costs associated with the need to block time in the limited number of chairs in transplant centers that are used to collect stem cells. It is difficult to predict whether mobilization with G-CSF will be successful, especially in heavily treated blood cancer patients. Many patients require multiple collections,

including approximately 40% of blood cancer patients. Additionally, of the biologically unrelated donors identified for patients, approximately half decline to donate, in part due to the lengthy and cumbersome donation process, which reduces the chance for finding a well-matched donor for the patient. Finally, patients with sickle cell disease can have severe side effects with G-CSF, including potentially fatal complications, and therefore, this agent is not used in these patients, leaving few mobilization options.

For patients who are unable to mobilize a sufficient number of functional stem cells with G-CSF, physicians may then be required to re-treat with G-CSF and add another drug, known as plerixafor. Plerixafor is a small molecule CXCR4 antagonist that blocks a pathway that otherwise plays an essential role in attracting and retaining HSCs in the bone marrow. It is approved for use in combination with G-CSF for patients who fail to achieve sufficient mobilization of stem cells with G-CSF alone. It can mobilize stem cells as a single agent but not to sufficient levels to be effective as a standalone agent in most disease settings. However, because plerixafor is the only available mobilization option for sickle cell disease patients who, as stated, cannot use G-CSF due to safety concerns, it is used as a single agent in this specific setting. Because of its poor efficacy as a standalone agent and the high number of stem cells required for a transplant, multiple doses of plerixafor and collections are needed in approximately 75% of sickle cell disease patients.



Current state of stem cell mobilization: an unreliable, inefficient, multi-day process

Our MGTA-145 Product Candidate

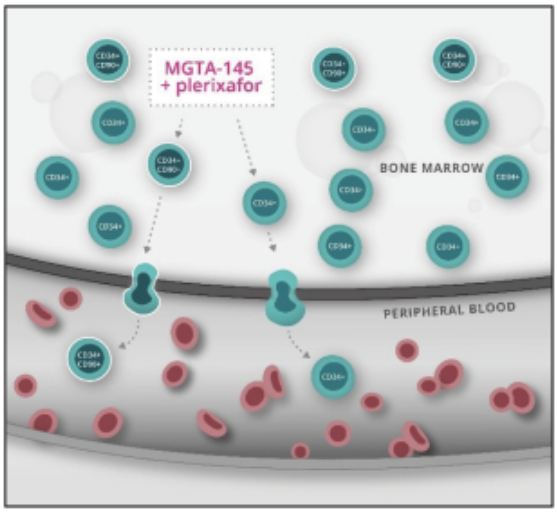
Magenta is developing MGTA-145 as a new first-line standard of care for stem cell mobilization in a broad range of diseases, for both autologous and allogeneic transplants. MGTA-145, a CXCR2 agonist, works in combination with plerixafor, a CXCR4 antagonist, to harness the physiological mechanism of stem cell mobilization.

The goal of MGTA-145 is to be the preferred first-line mobilization option for all patients and donors through rapid, reliable, predictable and safe mobilization and collection of high numbers of functional stem cells.

In May 2020, we received Orphan Drug Designation from the U.S. Food and Drug Administration, or the FDA, for MGTA-145 for the mobilization of HSCs to the peripheral blood for collection and subsequent transplant.

Mechanism of action

CXCR2 is a chemokine receptor expressed on the surface of neutrophils. Binding of MGTA-145 to the receptor results in neutrophil activation. Published data from Magenta founders and scientists show that a key event for mobilization of stem cells is the MGTA-145-mediated release of proteases from activated neutrophils, which together with the actions of the CXCR4 antagonist, plerixafor, results in the rapid release of HSCs from the bone marrow into the blood. Blocking CXCR4 using plerixafor and activating neutrophils with MGTA-145 has been shown to produce an effective and synergistic untethering and release of HSCs from bone marrow into the blood, resulting in rapid, reliable, predictable and safe mobilization of HSCs.



MGTA-145 in combination with plerixafor harnesses the natural mechanism of stem cell mobilization.

Clinical data

We have completed a Phase 1 trial of MGTA-145 plus plerixafor in healthy subjects. The trial met all primary and secondary endpoints.

The Phase 1 trial was a dose-finding trial to evaluate safety and activity of MGTA-145 and consisted of four parts:

- In Part A, healthy volunteers were dosed with MGTA-145 (0.0075 – 0.3 mg/kg) or a placebo.
- In Part B, subjects received a single dose of MGTA-145 (0.03 – 0.15 mg/kg) or a placebo in combination with a single dose of plerixafor (0.24 mg/kg).
- In Part C, subjects received MGTA-145 or a placebo plus plerixafor administered on day one and day two.
- In Part D, subjects received a single dose of MGTA-145 (0.03 or 0.015 mg/kg) plus plerixafor followed by a single apheresis collection of multiple blood volumes.

Clinical endpoints included safety and tolerability, pharmacokinetics, target engagement and pharmacodynamic effects.

Data from the trial presented at the American Society of Hematology, or ASH, in December 2020 showed that MGTA-145 was safe and well tolerated as a single agent and in combination with plerixafor, and that MGTA-145 in combination with plerixafor demonstrated rapid, single-day mobilization and collection of sufficient numbers of functional stem cells. MGTA-145 was shown to engage CXCR2 on neutrophils to mobilize CD34+ cells into peripheral blood with limited neutrophil activation, which may minimize risk of vaso-occlusive crises in patients with sickle cell disease.

Six subjects who received a single dose of MGTA-145 at the 0.03 mg/kg dose level and plerixafor in Part B mobilized a median of 40 CD34+ cells/microliter compared with a median of 26 CD34+ cells/microliter in subjects receiving plerixafor alone. Subjects in Part C demonstrated reliable mobilization of CD34+ cells on day two with peak counts that were comparable to day one mobilization yields, which suggests that two-day dosing and collection is feasible.

Single-day dosing and apheresis collection in eight subjects across two dose ranges in Part D yielded a median of four million CD34+ cells/kg. The clinically accepted threshold for a successful transplant is two million cells/kg.

Part B: Mobilization at 0.015 versus 0.03 mg/kg, 2h stagger

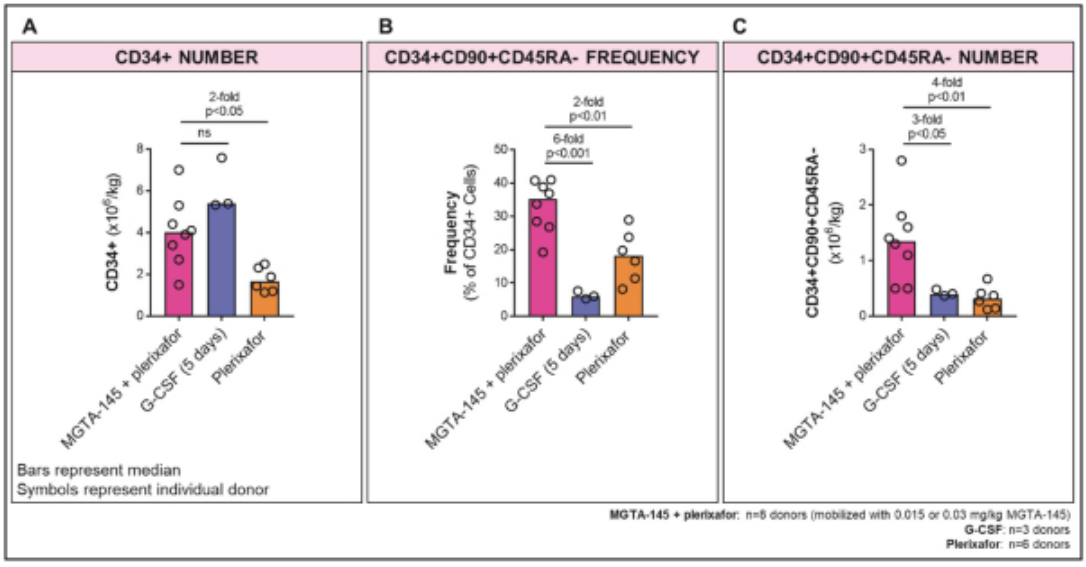
Mobilization Regimen	MGTA-145 dose (mg/kg)	Subjects (n)	Peak CD34+ (#/µL) Median (range)	% ≥20 / µL	%≥ 40 / µL
MGTA-145 + Plerixafor	0.015	6	**35** (17-78)	**83%** (5/6)	**33%** (2/6)
	0.03	6	**40** (18-63)	**83%** (5/6)	**50%** (3/6)
Plerixafor	0	14	**26** (13-78)	**64%** (9/14)	**21%** (3/14)

Part D: Apheresis Collection at 0.015 versus 0.03 mg/kg dose, 2h stagger

MGTA-145 dose (mg/kg)	Subjects (n)	Total CD34+ Yield (x10⁶) Median (range)	CD34+ / kg (x10⁶)		
			Mean	Median	Range
0.015	4	310 (118-525)	4.0	3.7	1.5 - 7.0
0.03	4	321 (239-500)	4.1	4.3	2.7 - 5.3

MGTA-145 in combination with plerixafor enables safe, same-day dosing, mobilization and collection of sufficient numbers of functional stem cells for transplant.

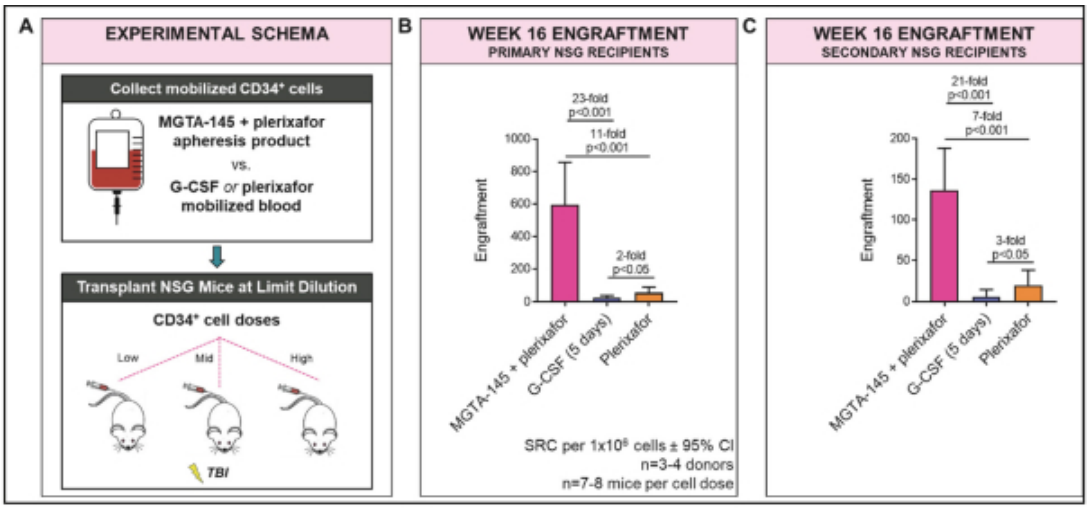
MGTA-145 in combination with plerixafor mobilized a greater proportion and number (three- to four-fold higher) of CD34+CD90+CD45RA- cells (a cell type enriched for functional stem cells) compared to subjects mobilized with either G-CSF or plerixafor alone.



MGTA-145 in combination with plerixafor enables greater collection of HSCs after apheresis in a Phase 1 healthy volunteer study. (A) CD34+ cell number, (B) CD34+CD90+CD45RA- cell frequency and

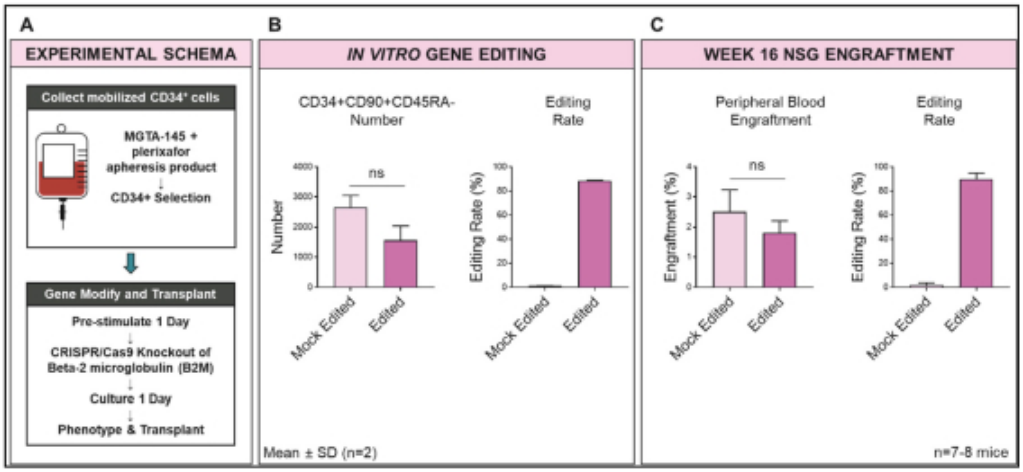
(C) CD34+CD90+CD45RA- cell number collected from healthy subjects mobilized with a single dose of MGTA-145 in combination with plerixafor (n=eight donors), a five-day regimen of G-CSF (n=three donors) or a single dose of plerixafor (n=six donors). Flow cytometric data shows that a median of $1.4x10^6$ ($0.50\text{-}2.8x10^6$) CD34+CD90+CD45RA- cells/kg were collected from MGTA-145+plerixafor mobilized donors, compared to $0.40x10^6$ ($0.36\text{-}0.48x10^6$) for G-CSF mobilized subjects ($p<0.05$) or $0.32x10^6$ ($0.12\text{-}0.67x10^6$) for plerixafor mobilized subjects ($p<0.01$). Bars represent median, each symbol represents an individual subject. Statistics were calculated by one-way ANOVA with post-hoc Tukey test. Plerixafor control data were first presented at the Transplant and Cellular Therapy, or TCT, annual meeting in February 2021.

Cells collected from four subjects dosed in Part D led to up to 23-fold higher multilineage engraftment in primary and secondary transplants in the immunodeficient NSG mouse model compared to cells mobilized by either G-CSF or plerixafor alone. These data demonstrate rapid and durable multilineage engraftment of MGTA-145 + plerixafor mobilized cells relative to other graft sources.



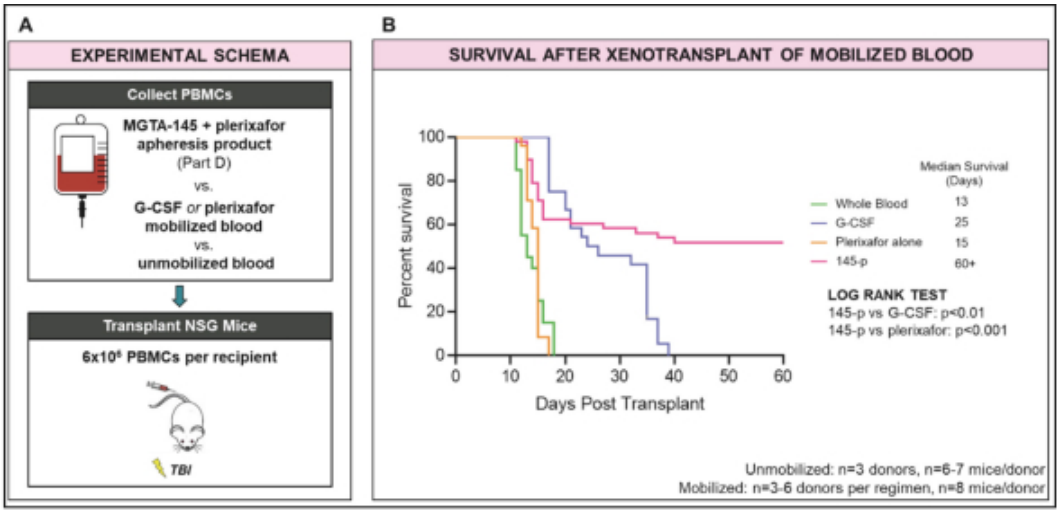
MGTA-145 + plerixafor CD34+ cells from Phase 1 healthy volunteer study show higher multilineage engraftment compared to G-CSF and plerixafor mobilized CD34+ cells. (A) CD34+ cells collected from healthy subjects mobilized with a single injection of MGTA-145 + plerixafor, five daily injections of G-CSF, or a single injection of plerixafor (n=3-4 donors) were transplanted into sublethally irradiated (200 cGy) NSG mice at limit dilution (3 cell doses). Engraftment of human CD45+ (hCD45+) cells in peripheral blood was measured at week 16 post-transplant by flow cytometry and SCID-repopulating cell (SRC) number was determined by ELDA in primary (B) and secondary (C) recipients. Data represent 7-8 mice per cell dose and are expressed as SRC number per $1x10^6$ cells +/- 95% CI.

Cells collected from healthy subjects mobilized with a single dose of MGTA-145 in combination with plerixafor in Part D were capable of efficient gene-modification and engraftment in a pre-clinical NSG mouse transplant study. Knockout of beta-2 microglobulin by CRISPR-Cas9 led to approximately 90% editing *in vitro* of CD34+CD90+CD45RA- cells and these cells engrafted in NSG mice, with maintenance of high levels of editing.



MGTA-145 + plerixafor CD34+ cells from Phase 1 healthy volunteer study can be efficiently gene modified and engraft in NSG mice. (A) CD34+ cells collected from healthy donors mobilized with a single injection of MGTA-145 in combination with plerixafor were gene-modified with CRISPR/Cas9 to knockout beta-2 microglobulin. (B) Edited cells (electroporated in the presence of guide RNA and Cas9) were compared to mock edited cells (electroporated in the absence of guide RNA and Cas9) and CD34+CD90+CD45RA- cell number and editing rates were measured by flow cytometry (n=2). (C) Mock edited or edited cells were transplanted into sublethally irradiated (200 cGy) NSG mice and engraftment of human CD45+ (hCD45+) cells and editing rates were measured at week 16 post-transplant in the peripheral blood by flow cytometry (n=7-8 mice).

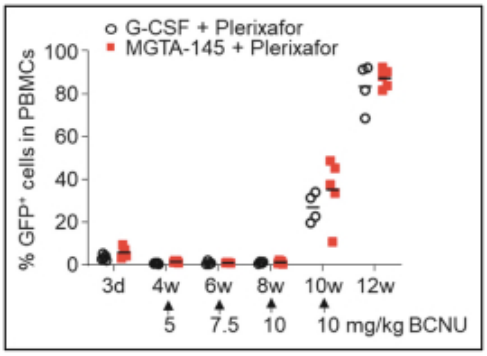
MGTA-145 + plerixafor mobilized grafts resulted in significantly less GvHD than G-CSF ($p<0.01$) or plerixafor ($p<0.001$) grafts (n=3-6 donors/source) in a xenogeneic mouse model.



MGTA-145 + plerixafor grafts from Phase 1 healthy volunteer study are immunosuppressive in a xenograft mouse model. (A) $6x10^6$ peripheral blood mononuclear cells, or PBMCs, collected from healthy

subjects mobilized with a single injection of MGTA-145 in combination with plerixafor, five daily injections of G-CSF, or a single injection of plerixafor (n=3-6 donors) were transplanted into sublethally irradiated (200 cGy) NSG mice at limit dilution (n=6-8 mice/donor). Graft sources were compared to unmobilized whole blood controls. (B) Kaplan-Meier survival curve of transplanted NSG mice. Pooled data from individual donors and mice show significantly enhanced survival after transplant with MGTA-145 in combination with plerixafor. Statistics were determined by a log-rank test.

Pre-clinical data presented at ASH in December 2020 showed that MGTA-145 plus plerixafor could be an efficient, single-dose mobilization regimen for *in vivo* HSC gene therapy. MGTA-145, when administered with plerixafor to wild-type mice or a mouse model of thalassemia, led to robust HSC mobilization, with no significant elevation of cytokines and significantly less leukocytosis than that observed following a five-day mobilization regimen with G-CSF plus plerixafor. MGTA-145 plus plerixafor mobilized cells were capable of efficient *in vivo* transduction using a helper dependent adenovirus (HDAd5/35++)-based vector platform. After in vivo selection, stable long-term, multilineage engraftment of gene-modified cells was observed in primary and secondary recipients (>90% gene marking). In a mouse disease model for thalassemia, phenotypic disease correction was observed after MGTA-145 plus plerixafor mobilization and *in vivo* transduction.



MGTA-145 + plerixafor can mobilize HSCs in mice prior to *in vivo* gene therapy. CD46-transgenic animals were mobilized with G-CSF + plerixafor (5 days) or MGTA-145 + plerixafor (single dose) and then injected one hour later with an integrating HDAd5/35++ mgmt./GFP vector, GFP marking was measured at the various time points after transduction. Arrows indicate timing and dose of the *in vivo* selection agent, O^6BG/BCNU. By week 12 post-transduction, >90% of PBMCs expressed GFP. No significant differences in gene marking were observed with the different selection agents.

Clinical development plan

We plan to develop MGTA-145 as a first-line therapy for stem cell mobilization in a broad range of diseases, for both autologous and allogeneic transplants. We have announced three ongoing and planned Phase 2 clinical trials to evaluate the potential utility of MGTA-145, in combination with plerixafor, for the mobilization and collection of stem cells in multiple autologous and allogeneic transplant settings:

- **Autologous Stem Cell Transplant of Multiple Myeloma Patients.** In December 2020, we announced the commencement of an investigator-initiated Phase 2 trial of MGTA-145, in combination with plerixafor, to mobilize and collect stem cells for autologous stem cell transplantation in multiple myeloma patients at Stanford University. This trial continues to enroll patients. We expect that this trial will provide data on stem cell mobilization and collection, durability of engraftment in transplanted patients and disease outcomes, including progression-free survival. Initial data from the study are expected in mid-2021.

- **Allogeneic Donor Stem Cell Mobilization and Collection for Stem Cell Transplant in AML, ALL and MDS Patients.** In June 2020, we announced a clinical trial collaboration with Be the Match to evaluate the potential utility of MGTA-145, in combination with plerixafor, to mobilize and collect stem cells from allogeneic donors for transplant in patients with acute myeloid leukemia, or AML, acute lymphocytic lymphoma, or ALL, and myelodysplastic syndromes, or MDS. The clinical trial commenced in February 2021 and will evaluate stem cell mobilization, collection, cell quality, engraftment and disease outcomes, including GvHD, which is of particular importance in the allogeneic transplant setting, as patients receive donor cells. Initial data from this clinical trial are expected in the second half of 2021.
- **Sickle Cell Disease – Stem Cell Mobilization and Collection in Patients; Cell Characterization; Pre-Clinical Gene Modification Model.** In December 2020, we entered into a Phase 2 clinical collaboration with bluebird bio, Inc. to evaluate the safety and potential utility of MGTA-145, in combination with plerixafor, for the mobilization and collection of stem cells in patients with sickle cell disease. Under the agreement, the companies will co-fund the clinical trial, which is currently expected to initiate in the second half of 2021. Each party will characterize the collected cells and Magenta plans to gene-modify the cells and transplant them into established pre-clinical models to evaluate engraftment. Data from this clinical trial could provide proof-of-concept for MGTA-145, in combination with plerixafor, as the preferred mobilization regimen for patients with sickle cell disease and, more broadly, across all HSC gene therapy applications.

Targeted Conditioning Program & Conditioning Research Platform

Conditioning: Targeted agents to selectively remove stem and/or immune cells. These product candidates are designed to lessen the need for high-dose or high-intensity chemotherapeutic agents or, in the case of gene therapy applications, potentially eliminate the need for chemotherapeutic agents altogether, and make stem cell transplant more effective.

Opportunity

Once sufficient cells have been mobilized and collected, patients must be prepared, or conditioned, for transplant. This treatment is intended to remove the disease-causing cells and make room for the new stem cells that will rebuild the healthy blood and immune system.

Conditioning for stem cell transplant and gene therapy is currently burdensome and risky for both pediatric and adult patients. The agents used today are non-targeted and involve high doses of systemic, toxic chemotherapy and/or radiation. Most of these genotoxic chemotherapy agents, including derivatives of mustard gas, were discovered more than 50 years ago and were never intended for stem cell transplant conditioning. The current treatments eradicate the stem cells, immune cells and diseased cells but also indiscriminately damage DNA and kill normal, healthy cells in the body. These conditioning regimens can cause long-term lung injury and liver toxicity, serious infections, organ failure, infertility, secondary cancers and even death. Nearly all transplant patients experience complications as a result of current conditioning treatments, and conditioning toxicity is responsible for up to 35% of mortality following allogeneic transplants.

These severe short- and long-term side effects and the mortality risk of conditioning are significant challenges for patients currently undergoing stem cell transplants and are also among the major barriers preventing stem cell transplants from being performed even more widely to enable more patients to benefit from a potentially curative treatment.

Whenever possible, physicians use the most aggressive conditioning regimens, known as myeloablative conditioning, or MAC, to generate optimal efficacy outcomes for oncology and gene therapy patients. For oncology patients who can tolerate these high-intensity conditioning regimens to prepare them for stem cell transplant, over 50% are alive and without disease relapse, known as relapse-free survival, at five years post-

transplant, an impressive survival rate in these high-risk patient populations. However, approximately 20% of patients receiving MAC regimens die from complications related to the transplant procedure, known as transplant-related mortality, and a significant majority experience serious short- and long-term side effects.

For the many patients that cannot tolerate such intense and toxic regimens due to advanced age or co-morbidities, such as decreased organ function, recent efforts have focused on reducing chemotherapy doses in regimens known as reduced intensity conditioning, or RIC. While significantly better tolerated, these RIC regimens have significantly poorer disease outcomes at five years post-transplant. Over 50% of patients receiving RIC relapse and only approximately 30% of patients are alive without relapse at five years following stem cell transplant. Therefore, physicians and patients must currently choose between either the superior long-term efficacy of MAC or the improved safety and tolerability of RIC.

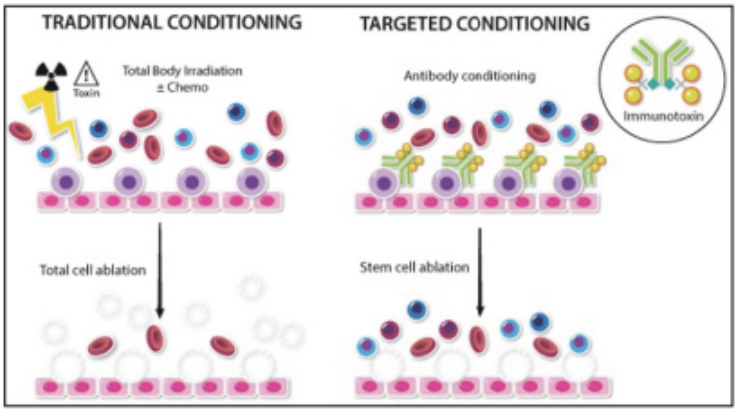
Emerging clinical data have also shown that autoimmune disease can be cured with an immune system reset through autologous stem cell transplant, with recent data in multiple sclerosis and scleroderma. When compared to the standard of care in relapsing remitting multiple sclerosis, clinical trials have shown that the proportion of patients with clinical benefit at two years appears to be double that of the next best treatment and that transplant prolongs the time to disease progression compared with disease modifying therapies. However, the toxicity of the required conditioning regimens has historically led many physicians to conclude that the risks of transplant in these patient populations outweigh the benefits. The current high-dose chemotherapeutic regimens that are used to condition patients can cause severe cardiac, lung, liver and gastrointestinal toxicities, serious infections, organ failure, infertility, secondary cancers and even death. Currently only approximately 6% of eligible patients with multiple sclerosis and scleroderma receive a stem cell transplant, in part due to these significant risks. Magenta believes we can significantly expand the number of autoimmune patients who can benefit from immune reset with effective and safe targeted conditioning.

Our Conditioning Programs

Our targeted conditioning programs are designed to selectively eliminate stem cells and/or immune cells from a patient prior to transplant or gene therapy, and to be far less toxic than the current radiation and chemotherapy-based treatments. These programs focus on developing targeted products that remove specific cell types, with an approach that is tailored to the patient's disease and transplant requirements.

We are developing a suite of novel ADCs for conditioning, a step in the transplant process that currently relies on the use of systemic chemotherapy agents and radiation. We are seeking to replace these toxic, non-targeted conditioning agents with targeted ADCs. While ADCs are an established treatment for certain cancers, we believe this is the first time that ADC technology has been harnessed for transplant medicine. These programs have the potential to extend the curative power of blood and immune reset to all of the currently eligible patients, and also to expand the number of patients who are considered eligible. Additional eligible patients would include more patients with autoimmune diseases, such as multiple sclerosis and systemic sclerosis, where the current risk-benefit tradeoff of transplant is not considered favorable for many patients due to the toxicity of the existing conditioning regimens.

ADCs are a technology developed over the past 20 years where a monoclonal antibody specific for a cell surface protein is coupled to a drug via a molecule known as a linker. The ADC binds the receptor on the target cell, is internalized and degraded to release the drug into the target cell. Coupling the drug to the antibody increases the specificity of drug delivery to the target cell, reducing systemic exposure and increasing the safety and efficacy compared to delivering the drug alone or the antibody without the drug attached. Today, most ADCs are directed toward treating cancer cells expressing specific target receptors enriched on tumor cells. Our programs build on this clinically validated modality and adapt it for preparing patients for blood and immune reset through stem cell transplant.



Targeted conditioning with ADCs is more specific compared to traditional conditioning. Traditional conditioning is performed with total body irradiation and chemotherapy which eliminates all HSCs and nonspecifically damages other organs. Targeted conditioning with an ADC specifically eliminates the disease-causing cells while avoiding systemic side effects.

In our development of ADCs for use in conditioning, we are optimizing for several key parameters:

- First, the antibody must specifically target a receptor that is expressed on the cells of interest.
- Second, to comply with typical stem cell transplant conditioning timelines, the antibody must have suitable efficacy to ensure that the ADC is able to remove the target cells rapidly, in days rather than weeks or months.
- Third, the antibody clearance from the body needs to be accelerated so that it is eliminated by the time the transplanted cells are infused into the patient, typically within a week of starting conditioning. This requirement stems from the fact that the target receptor is expressed on cells present in the patient but also on the similar cell types in the transplanted cells.
- Finally, the drug must be able to remove non-dividing cells, as most HSCs and immune cells are not actively dividing. The ADC linker must be chosen to minimize damage to non-target cells.

We are addressing each of these requirements through careful selection of the appropriate target receptor as well as antibody properties, including binding site, affinity, half-life and linker-drug.

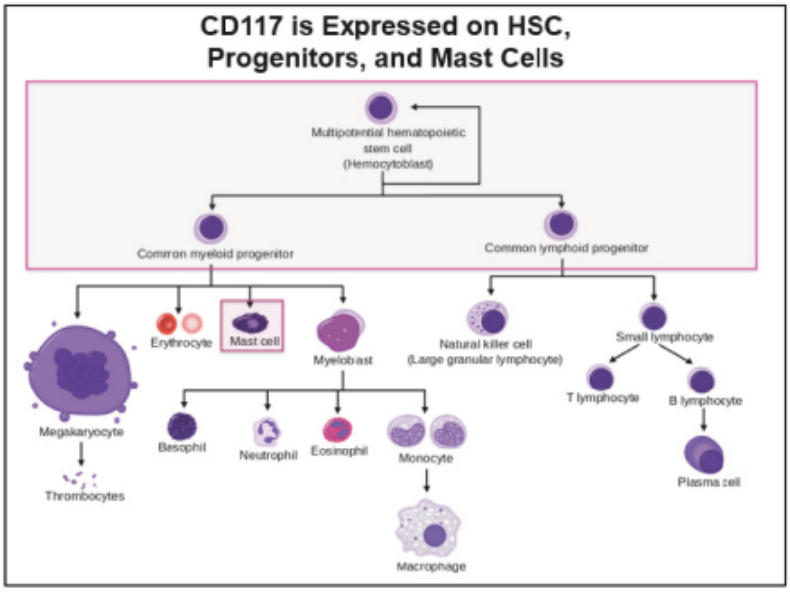
Our targeted conditioning programs include both our ADC programs and earlier-stage research programs that leverage alternate modalities for targeted cell depletion. This is achieved by tuning the antibodies to specific cellular markers or receptors that are expressed on the particular cell types. These drugs are designed to specifically remove only the cell types required for a successful transplant, with an approach that is tailored to the patient's disease and transplant requirements:

- **MGTA-117:** targets HSCs and genetically mutated stem cells that cause acute myeloid leukemia and myelodysplastic syndromes.

- **C100:** targets HSCs and immune cells. Our lead target under the C100 program is CD45 and our lead product candidate is referred to as CD45-ADC.
- **C300:** targets only immune cells.
- **G100:** targets alloreactive T cells implicated in GvHD.

MGTA-117 product candidate

Our most advanced conditioning product candidate, MGTA-117, is designed to specifically remove disease-causing HSCs and genetically mutated cells. MGTA-117 targets CD117, also known as c-Kit, which is highly expressed on HSCs and leukemia cells, making it an ideal target for conditioning across broad sets of diseases. This includes certain blood cancers, hemoglobinopathies (sickle cell disease and beta-thalassemia) and inherited metabolic disorders, with potential applicability in both stem cell transplant and HSC-based gene therapies. We have declared a development candidate, MGTA-117, which is an anti-CD117 antibody conjugated to an amanitin payload.

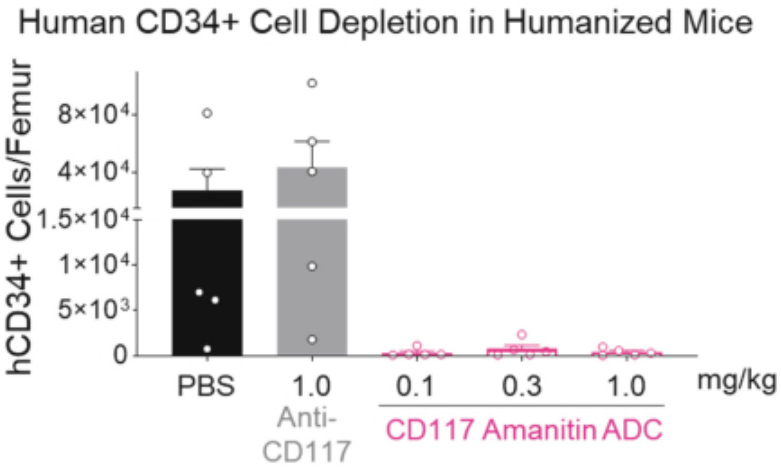


Based on: Nobili et.al., Long non-coding RNAs in normal and malignant hematopoiesis. Oncotarget (2016).

Our anti-human CD117 amanitin ADC has been shown in preclinical studies to deplete HSCs and leukemia cells, therefore we hypothesize it will improve conditioning in patients with acute myeloid leukemia and myelodysplastic syndromes where stem cell transplant is already the standard of care. We believe that MGTA-117, in combination with reduced-intensity conditioning, has the potential to demonstrate clinical outcomes that preserve the safety and tolerability of RIC while achieving the efficacy of MAC. Likewise, gene therapy is a promising approach to treat a variety of non-malignant diseases, including inherited metabolic disorders, sickle cell disease and beta-thalassemia, but the risks and toxicity associated with current chemotherapy-based conditioning approaches may limit the utility of this approach. Through its targeted approach, MGTA-117 has the potential to provide a safe and effective approach to preparing patients for stem cell transplant or HSC-based gene therapy.

Preclinical data

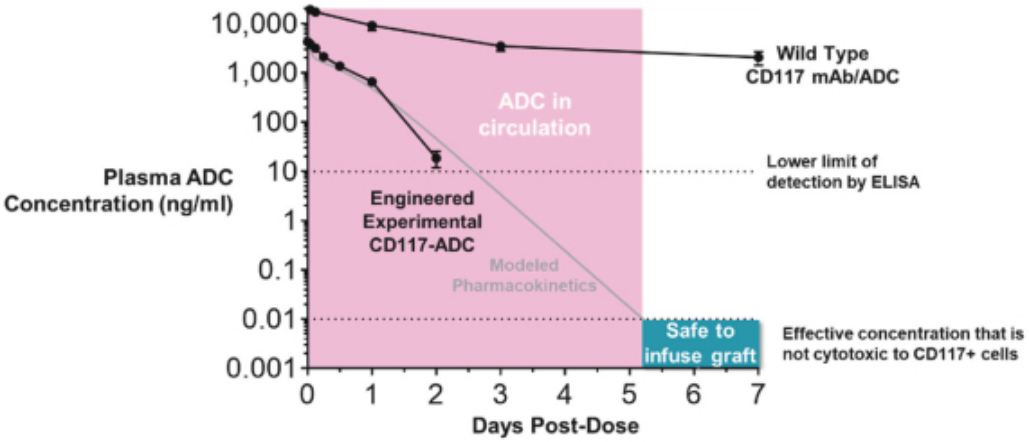
Our experiments have validated the concept of using an ADC targeting CD117 in animal models of conditioning and transplant. We found that a single dose of an experimental anti-murine CD117-ADC was able to successfully deplete HSCs in immunocompetent mice and allow successful transplant. We then showed in humanized mice that a single dose of an anti-human CD117 amanitin ADC was able to remove CD34+ HSCs from the bone marrow. In contrast, treatment with an unconjugated CD117 antibody did not have a significant impact on HSCs.



The anti-human CD117 amanitin ADC selectively depletes CD34+ human stem and progenitor cells in humanized NSG mice. The depletion is on target and payload dependent as the naked antibody (Anti-CD117) has no effect. CD117 amanitin ADC or controls were dosed on day 0. Bone marrow was collected on day 21 and analyzed by flow cytometry. The number of CD34+ cells remaining in the bone marrow of CD117 amanitin ADC or control treated mice 21 days after a single administration is shown. * denotes p value < 0.05 vs PBS group.

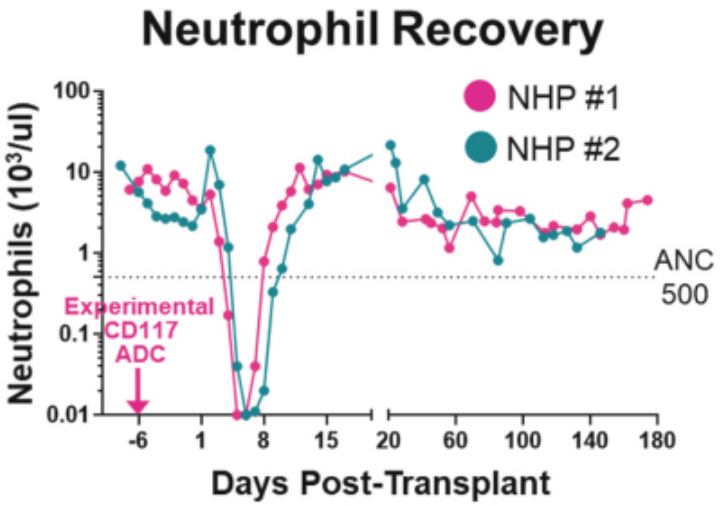
We subsequently partnered with the National Institutes of Health, or NIH, to investigate an experimental non-amanitin CD117-ADC in a non-human primate transplant study using HSCs modified with a lentiviral vector encoding the beta-globin gene, the gene that causes sickle cell disease and beta-thalassemia. Results from the study were presented by Dr. John Tisdale of the NIH at the ASH annual meeting in December 2019.

The experimental CD117-ADC was engineered to have a fast half-life to clear the body quickly, and it enabled transplant of gene-modified HSCs within days of dosing in non-human primates.



The experimental CD117-ADC is a full length human IgG1 that has been engineered to have fast clearance and allows for safe graft infusion within five days after dosing. The engineered half-life experimental CD117-ADC demonstrates rapid clearance (10 hour half-life) in non-human primates with a half-life suitable for transplant (n=3/group). The wild type CD117 antibody half-life is approximately three days. The experimental CD117-ADC drops below limit of detection for the assay after 48 hours and modeled pharmacokinetics (gray line) predicts the ADC will be below cytotoxic concentrations after five days.

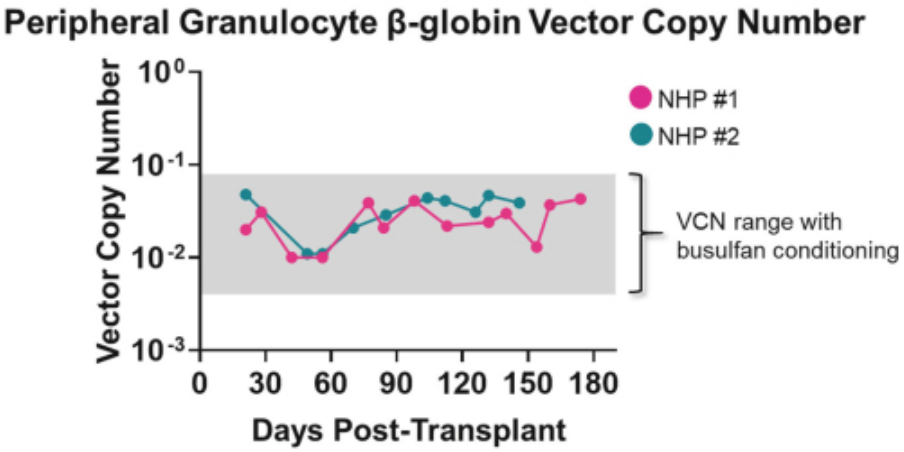
This study showed, for the first time, that a single dose of an experimental CD117-ADC selectively depleted HSCs in non-human primates, while sparing immune cells, which are important for recovery following transplant**.** The single dose of this experimental CD117-ADC in non-human primates enabled successful transplant and engraftment of HSCs modified with a lentiviral vector encoding the beta-globin gene.



Experimental CD117-ADC enables engraftment of autologous gene-modified HSCs in a non-human primate, or NHP, model. CD34+ cells were harvested from two rhesus NHPs and transduced with lentiviral

vector encoding beta-globin. The transduced cells were transplanted into the same animals six days after a single dose of experimental CD117-ADC. The neutrophil counts before and after transplantation of the transduced cells are shown for animal #1 (magenta line) and animal #2 (teal line). The animals recovered their neutrophils on day eight (animal #1) and day ten (animal #2).

The vector copy number, or VCN, was stable beyond three months, the longest time point in the study, suggesting that the gene-modified cells persisted in the body. This was comparable to historical data with multiple doses of busulfan conditioning.



Conditioning Regimen	Animal Number	CD34 dose (x10^6 cells/kg)	VCN of infused cells	Peripheral VCN @ 1-6 months
Experimental CD117-ADC	NHP #1	3.3	5	0.01-0.04
	NHP #2	1.1	4	0.01-0.05
Busulfan	Busulfan Cohort *Uchida et al. Mol Ther 2019	4.1-4.2	8-10	0.004-0.08

The vector copy number (VCN) of the transduced CD34+ cells used for the experimental CD117-ADC conditioned animal was lower compared to the VCN of the cells used in the busulfan conditioned animals. The peripheral granulocyte VCN is stable over time and in the same range as observed with busulfan conditioned animals shown in gray. This indicates the conditioning with experimental CD117-ADC is sufficient to enable engraftment of gene modified HSCs.

The experimental CD117 ADC was well tolerated in non-human primates with no evidence of the often severe side effects seen with busulfan conditioning, including veno-occlusive disease, weight loss, diarrhea, mucositis, vomiting, pulmonary fibrosis or seizures. No experimental CD117 ADC-related blood chemistry changes outside normal range were observed.

We believe these proof-of-concept studies validate the use of a CD117-ADC for targeted stem cell depletion prior to transplant and support its use as a new conditioning agent for gene therapy and stem cell transplant without toxic chemotherapy or radiation.

Anti-tumor activity of CD117 Amanitin ADC

In data presented at the ASH annual meeting in December 2020, we showed that an anti-human CD117 amanitin ADC was effective at killing human acute myeloid leukemia cells growing *in vitro*. To extend these data, we also assessed the ability of the CD117 amanitin ADC to reduce tumor burden and result in a survival benefit in mice bearing a human acute myeloid leukemia cell line or patient-derived recurrent/relapsed acute myeloid leukemia that was resistant to multiple lines of therapy, including previous allogeneic transplant. Tumor-bearing mice treated with a single dose of CD117-ADC showed improved survival compared to mice left untreated or those treated with isotype ADC or multiple doses of ARA-C.

Clinical development plans

We currently intend to pursue the development of MGTA-117 (an amanitin-based ADC) for patients with certain blood cancers, such as acute myeloid leukemia and myelodysplastic syndromes, and for patients with genetic diseases who are eligible for stem cell gene therapy.

We have declared a development candidate, MGTA-117, and have moved it into Investigational New Drug, or IND, -enabling studies. We have recently completed GLP toxicology studies and our GMP manufacturing process, as well as completing our pre-IND communications with the FDA. We expect to file an IND application with the FDA in mid-2021. Upon acceptance of this IND, we plan to initiate a Phase 1/2 clinical trial evaluating MGTA-117 in patients with acute myeloid leukemia and myelodysplastic syndromes to generate initial safety and pharmacokinetic data in the fourth quarter of 2021. These initial data are expected to be directional for our dose escalation plans.

In 2020, we also announced two non-exclusive research and clinical collaborations to evaluate the potential utility of MGTA-117 for conditioning of patients prior to stem cell-based gene therapies:

- **Lysosomal Storage Disorders.** In May 2020, we entered into an agreement with AVROBIO, Inc. to evaluate the potential utility of MGTA-117 for conditioning of patients receiving one or more of AVROBIO, Inc.'s investigational lentiviral gene therapies.
- **Hemoglobinopathies.** In June 2020, we entered into an agreement with Beam Therapeutics, Inc. to evaluate the potential utility of MGTA-117 for conditioning of patients with sickle cell disease and beta-thalassemia receiving Beam Therapeutics, Inc.'s base editing gene therapies.

C100 Program

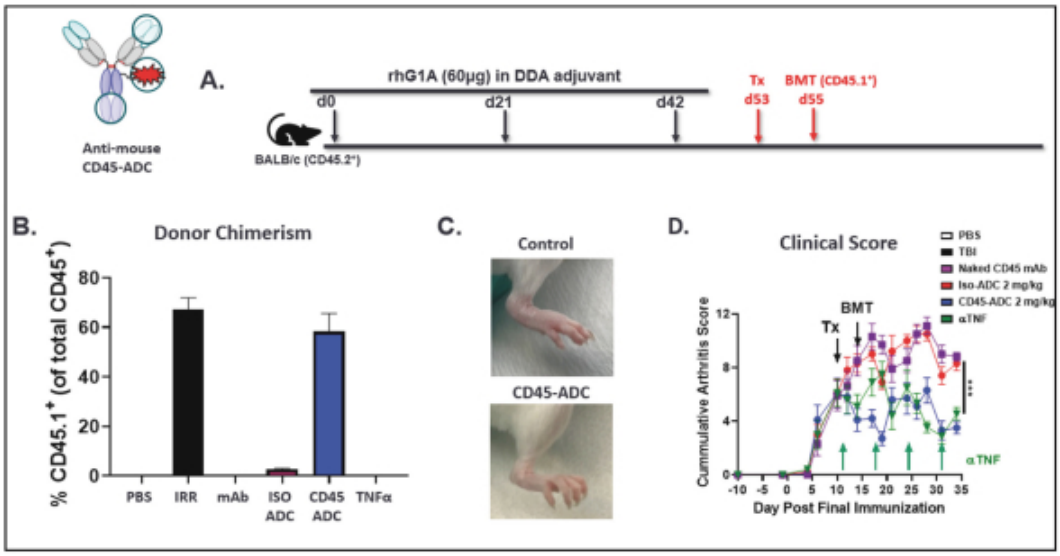
Our second ADC-based conditioning program, C100, targets both patient HSCs and disease-causing immune cells. For many stem cell transplant applications, it is important to eliminate both immune cells and HSCs in the patient prior to transplant. This is especially important in the allogeneic setting where host immune cells can elicit an immune-mediated rejection of the incoming foreign stem cells. In addition, immune cell depletion is a key feature of the use of autologous stem cell transplant in patients with severe autoimmune disease. In this case, the goal is to eliminate the disease-causing auto-reactive immune cells that perpetuate the underlying autoimmune disease. Lastly, for cancer patients with tumors expressing CD45, there may also be a direct anti-tumor effect providing additional therapeutic benefit. For these reasons, we are developing product candidates that simultaneously target both HSCs and immune cells.

Our lead target for the C100 program is CD45, an important cell surface molecule broadly expressed throughout the hematopoietic and immune systems. We believe CD45-ADC has the potential to significantly increase the number of patients eligible to receive a stem cell transplant, particularly those patients with autoimmune diseases and acute leukemias.

Preclinical data

Mouse Models of Autoimmune Disease

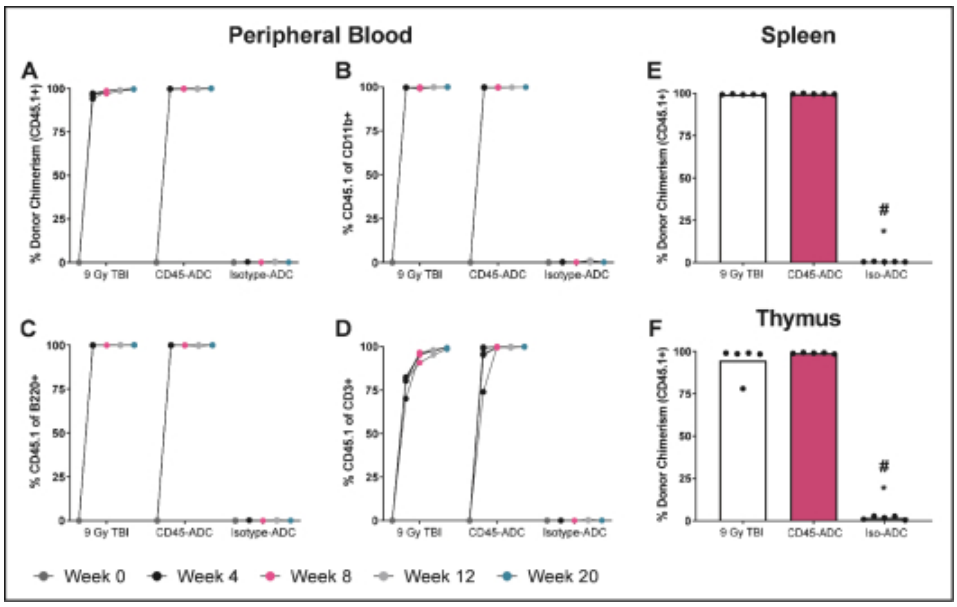
Data presented at the Transplant and Cellular Therapy, or TCT, and the European League Against Rheumatism, or EULAR, annual meetings in 2020 showed that a single dose of CD45-ADC removed disease-causing reactive T cells, enabled successful blood and immune reset and rebuild of the immune system and was well tolerated in a reliable murine model of autoimmune disease, proteoglycan-induced arthritis. Further, a single dose of CD45-ADC significantly reduced disease incidence and delayed disease onset in this model that has successfully provided preclinical proof of concept for many clinically validated standard-of-care therapies.



Therapeutic Treatment with CD45-ADC Enables Immune Reset via Congenic Bone Marrow Transplant and results in halt of disease progression in a murine model of Rheumatoid Arthritis. BALB/c mice ($CD45.2^+$) were given three immunizations (study day 0, 21, and 42) with recombinant human core G1 aggrecan (60 mg in 2 mg DDA) (**A**). Animals were treated on day 11 post the final immunization (study day 53) and conditioned animals were transplanted with Balb/c $CD45.1^+$ congenic bone marrow 48 hours later. Animals treated with a neutralizing monoclonal antibody to murine TNFa received 500 mg/mouse IP weekly starting on study day 53. Treatment with 2 mg/kg of CD45-ADC, but not Isotype-ADC, enabled full congenic donor chimerism in peripheral blood (**B**) at three weeks post-transplant. Representative paws from control and CD45-ADC – treated animals are shown in (**C**). Scores for the treatment groups over time are graphed in (**D**).

Mouse Models of Transplant

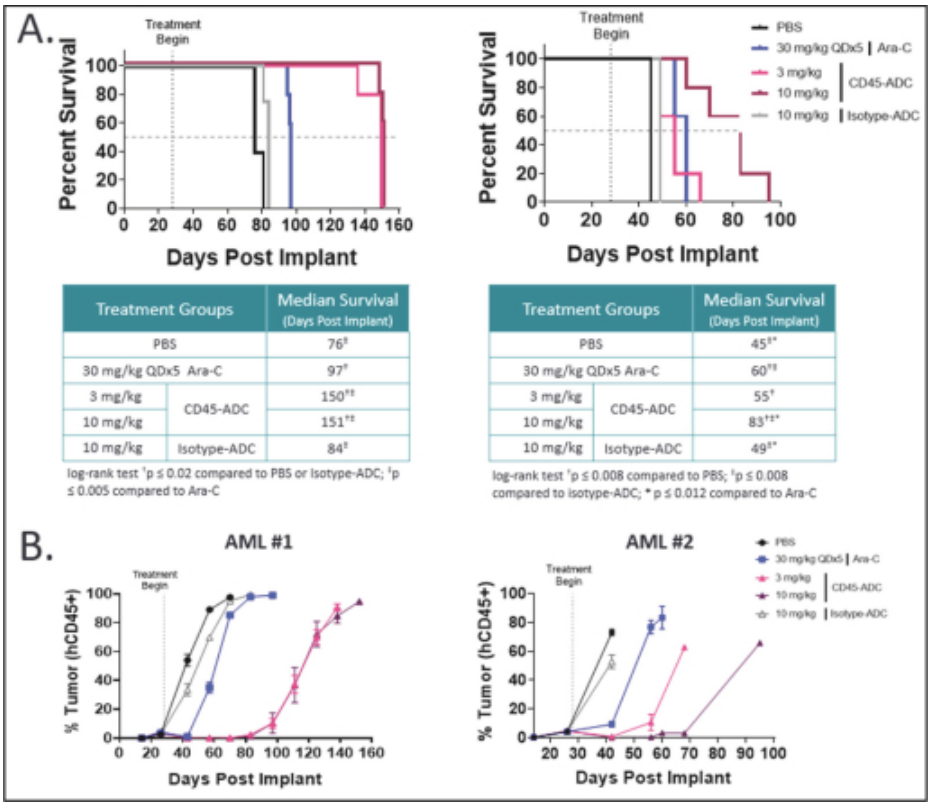
Data presented at the European Society for Blood and Marrow Transplantation, or EMBT, and ASH annual meetings in 2020 and at the TCT annual meeting in February 2021 showed that a single dose of CD45-ADC is fully myeloablative and enables complete chimerism in a full mismatch allogeneic stem cell transplant model without the need for additional conditioning agents.



A single dose of 5 mg/kg CD45-ADC is sufficient to enable allogeneic transplant of Balb/c CD45.1 donor cells into C57BL/6 recipients. (A-D) C57BL/six mice were conditioned with 5 mg/kg Isotype-ADC or CD45-ADC. CD45-ADC enables [3] 95% donor chimerism (A) and peripheral donor engraftment is multilineage through week 20. (B-D). Terminal splenic (E) and thymic (F) chimerism in CD45-ADC conditioned mice were similar to TBI. *p<0.05 versus TBI; #p<0.05 versus CD45-ADC; ANOVA with post hoc Tukey's multiple comparisons test.

Oncology Model Results

Data presented at the TCT annual meeting in 2020 demonstrated that a single dose administration of a short half-life CD45-ADC is well tolerated and is capable of reducing tumor burden by potently targeting leukemia cells in xenograft models. It significantly prolonged the median survival of established cell line and patient derived xenograft models as compared to both untreated controls and a multi-dose regimen of ARA-C, a standard-of-care chemotherapy.



Treatment Groups		Median Survival (Days Post Implant)
PBS		76[‡]
30 mg/kg QDx5 Ara-C		97[†]
3 mg/kg	CD45-ADC	150[*†‡]
10 mg/kg	CD45-ADC	151[*†‡]
10 mg/kg	Isotype-ADC	84[‡]

log-rank test [†]p ≤ 0.02 compared to PBS or Isotype-ADC; [‡]p ≤ 0.005 compared to Ara-C

Treatment Groups		Median Survival (Days Post Implant)
PBS		45[†*]
30 mg/kg QDx5 Ara-C		60[*†]
3 mg/kg	CD45-ADC	55[†]
10 mg/kg	CD45-ADC	83[*†*]
10 mg/kg	Isotype-ADC	49[†*]

log-rank test [†]p ≤ 0.008 compared to PBS; [‡]p ≤ 0.008 compared to isotype-ADC; * p ≤ 0.012 compared to Ara-C

A single dose of a short half-life CD45-ADC increases survival (A) and effectively decreases tumor burden (B) of human acute myeloid leukemia cells in two patient derived xenograft models compared to vehicle (PBS) or isotype-ADC, and comparable to a multi-dose regimen of ARA-C, a standard-of-care chemotherapy. Treatment began when 2-16% tumor blasts were detected in the periphery (n=3-5 mice/group/AML PDX model). Mice were treated with a single intravenous dose of anti-human CD45-ADC, isotype-ADC, or vehicle (PBS). ARA-C chemotherapy was administered intravenously once daily for five consecutive days. (A) Survival of CD45+CD117+ PDX AML mice treated with a single intravenous dose of CD45-ADC was significantly increased as compared to PBS or isotype-ADC controls (B). CD45-ADC significantly delayed tumor burden (expressed as %hCD45) in the peripheral blood of treated mice compared to PBS, isotype-ADC and standard of care controls.

Development plans

We plan to develop CD45-ADC for use in patients with autoimmune diseases, such as multiple sclerosis and scleroderma, and patients with leukemias and myelodysplastic syndromes. We have identified a lead antibody and progressed this program into IND enabling studies, which we plan to further advance in 2021.

C300 Program

Our third ADC-based conditioning program, C300, targets T cells, a type of immune cell. T cell depletion is currently performed with highly toxic, non-specific drugs which can lead to immune deficiency, infections and other complications, including secondary autoimmune reactions. We are pursuing targets expressed on the surfaces of T cells with the goal of offering a safer and more optimized targeted conditioning approach through T cell depletion before cell therapy such as CAR-T for blood cancers, prevention of stem cell rejection prior to allogeneic stem cell transplant or achievement of immune system reset through autologous stem cell transplant in patients with autoimmune diseases.

G100 Program

We are developing our G100 product candidate as a targeted conditioning agent with the aim of preventing acute GvHD. GvHD is a reaction that commonly develops after an allogeneic stem cell transplant and occurs when the transplanted cells see the recipient's body as foreign. The grafted cells then attack their new host. It is the result of the donor T cells not matching the recipient's, and this underscores the importance of matching between the donor and the recipient. If they are not well matched, the donor's T cells recognize the recipient's cells as foreign and attack them. Recipients who receive poorly matched stem cells are among those at the highest risk of developing this condition. However, GvHD can occur even with proper matching.

Acute GvHD typically occurs within the first 100 days following transplant and can severely damage the skin, liver and gastrointestinal system. It occurs in approximately 50% of patients receiving an allogenic stem cell transplant, depending on several factors including cell source and conditioning regimen, and accounts for approximately 10% of deaths following an allogeneic transplant. Approximately 40% of all stem cell transplants are allogeneic. Current treatments for acute GvHD prevention include the prophylactic use of immune suppressive agents that prevent T cell activation, such as cyclosporine or tacrolimus along with mycophenolic acid, which inhibits DNA base synthesis which is required by proliferating T cells or steroids.

Despite the use of these powerful immune suppressive agents, most allogeneic transplant patients will experience GvHD. For severe cases, patients are treated with high doses of steroids, immune ablating antibodies or chemotherapy. The use of high-dose non-specific immune suppressive agents for GvHD treatment is correlated with an increased risk of opportunistic and viral infections, poor immune function and is a leading cause of death in allogenic transplant patients.

Our G100 product candidate is an ADC designed to selectively eliminate the cells that cause acute GvHD, specifically the alloreactive T cells. This ADC product candidate is intended to be dosed *in vivo* at the time of transplant and eliminate the activated alloreactive T cells. By specifically targeting the alloreactive T cells that arise shortly after transplant, this product candidate has the potential to spare the remainder of the immune system to allow immune recovery and protection from opportunistic infections.

Cell Therapy Programs

MGTA-456: High-dose, well-matched allogeneic investigational stem cell therapy for use in patients with high-risk hematologic malignancies

Opportunity

It is critical that patients receive a sufficiently high dose of well-matched HSCs in a stem cell transplant, as higher cell doses and better matched cells are closely correlated to improved patient outcomes. In allogeneic transplant, up to half of patients will not find a suitable donor within their biological relatives or among registered bone marrow donors. Long search times for unrelated, well-matched donors and their frequent unavailability represent a major challenge, particularly for patients with diseases that can progress rapidly, such as certain inherited metabolic disorders and high-risk acute leukemias. Because of the urgency for these patients to undergo transplant, there is a need for improved options, and the ability to quickly find a well-matched stem cell donor with sufficient volume of cells remains one of the most significant hurdles in achieving successful stem cell transplant.

Cell dose and degree of graft matching are independent risk factors impacting risk of non-relapse mortality in individuals undergoing cord blood transplant for acute leukemia. Low numbers of CD34+ stem cells can result in prolonged periods of cytopenia and higher risk of graft failure. The availability of MGTA-456 could reduce the barriers associated with cell dose and poor matching that currently limit the successful use of cord blood in transplant. MGTA-456 is currently being evaluated in a Phase 2 study in patients with high-risk blood cancers undergoing stem cell transplant. Enrollment is this study has been completed and patients are currently in a follow-up period.

Our MGTA-456 product candidate

MGTA-456 is an investigational, novel, proprietary allogeneic stem cell therapy designed to provide a high dose of stem cells that are well matched to the patient. Larger stem cell doses and better matched transplants are both correlated with more successful transplant outcomes, reduced risk of transplant failure and faster time to engraftment and immune recovery.

Clinical data: blood cancers

Data were presented at the TCT annual meeting in February 2021 from 18 patients transplanted in a Phase 1/2 clinical trial in patients with blood cancers. The trial showed that expansion of CD34+CD90+ cells in MGTA-456 results in rapid and sustained hematopoietic recovery, complete engraftment in all subjects, improved matching in adults weighing >59 kg and reduced incidence of GvHD. In addition, neutrophil recovery occurred in 100% of patients at a median of 17 days versus 23 days in recipients of unmodified cord blood. Similarly, platelet recovery was higher (94% vs. 74%) and faster (median 36 days vs. 59 days) for patients receiving MGTA-456 versus unmodified cord blood, respectively. Both neutrophil and platelet recovery correlated to dose of CD34+CD90+ cells. With all patients now out beyond day 100, only one patient had grade 3-4 acute GvHD and one had chronic GvHD limited to the oral mucosa (off immunosuppression 15 months after transplant).

Development plan

Previously, MGTA-456 was evaluated in patients with rare genetic inherited metabolic disorders. In June 2020, we announced that we would discontinue enrollment in our Phase 2 trial of MGTA-456 in patients with inherited metabolic disorders undergoing stem cell transplant. This decision was the result of several factors, including enrollment challenges common to rare disease populations, which were heightened as a result of the COVID-19 pandemic; a growing understanding in the transplant field of the current challenges of allogeneic stem cell transplant in patients with non-malignant diseases, including inherited metabolic diseases; and feedback from the FDA on endpoints and clinical trial design for registration.

We will continue to evaluate the data for MGTA-456 in blood cancers through the investigator-initiated Phase 2 trial in blood cancers at the University of Minnesota to inform best next steps for the program.

E478: AHR antagonist for expansion of gene-modified stem cells

Opportunity

Stem cell transplant with gene-modified HSCs, which is referred to as stem cell gene therapy or genome editing, is a promising treatment approach for many diseases. However, this approach is significantly limited by (1) the inability to generate a sufficient dose of gene-modified HSCs that retain the ability to durably engraft in patients and (2) the cost and complexity of manufacturing viral vectors for gene modification of cells. These constraints could limit the commercial viability of this approach.

The ability to expand HSCs *ex vivo* has the potential to improve outcomes with gene therapy or genome editing by increasing the dose of genetically modified stem cells. This has been a long-term goal of the field and

has the potential to reduce manufacturing costs for these therapies by requiring less viral vector for gene modification of the stem cells. Scaling up vector manufacturing in a cost-effective manner has been a significant challenge for HSC-based gene therapy companies and a significant cost driver. Such cost and capacity issues could limit the commercial viability and widespread deployment of gene therapies.

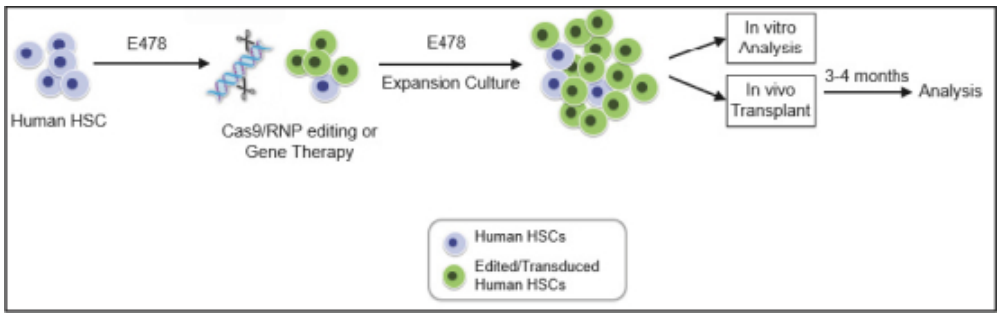
Our E478 product candidate

We developed the E478 program in response to an unmet technological need recognized in the field of stem cell gene therapy – the challenge of achieving sufficiently high doses of gene-modified stem cells. E478 is a novel and proprietary small molecule AHR antagonist that was developed to increase the number of gene-modified HSCs *ex vivo* for stem cell based-gene therapy. E478 uses the same clinically validated method used to produce MGTA-456, AHR antagonism, to expand gene-modified HSCs.

We believe that E478 could represent a key component for unlocking the full value of gene therapy by providing each patient with an optimal dose of gene-modified HSCs for rapid and successful engraftment. In addition to addressing cell dose limitations, the ability to expand long-term repopulating HSCs *ex vivo* has the potential to reduce manufacturing costs for these therapies by requiring less viral vector for gene modification of the stem cells.

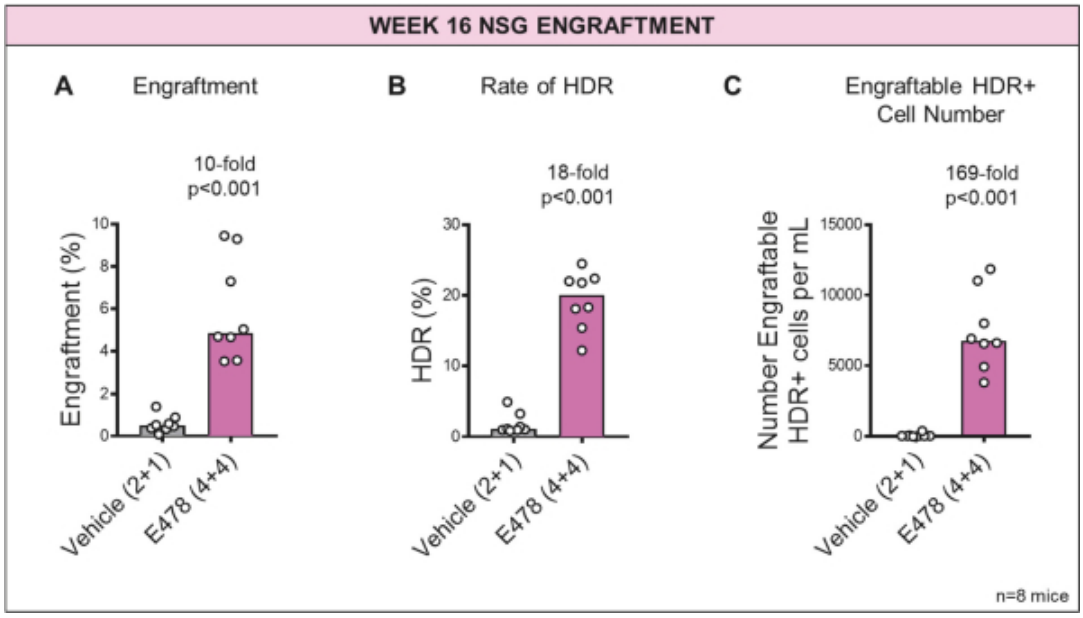
Preclinical data

We have shown that E478 can generate higher numbers of long-term engrafting human HSCs compared to other expansion technologies. We have presented *in vitro* and *in vivo* data demonstrating successful expansion of gene-modified HSCs from both bone marrow and mobilized blood cell sources with E478 and showed that *ex vivo* expansion with E478 leads to higher and durable levels of engraftment in NSG mice compared to conventional culture approaches. Our data demonstrate that HSCs modified via lentiviral transduction, CRISPR/Cas9 and other gene-modifying approaches can be expanded *in vitro* by E478 and engraft *in vivo* in NSG mice.



We performed experiments designed to evaluate the ability of E478 to increase HSC numbers for HSC based gene therapy. In these studies, human CD34+ cells isolated from G-CSF mobilized peripheral blood were cultured with cytokines in the presence or absence of E478 and transduced with lentiviral vectors expressing a green fluorescent protein to identify cells that were effectively transduced. Inclusion of E478 increased the number of CD34+ cells and significantly improved the level of human cell engraftment in NSG mice while maintaining high levels of transduction. Similar findings were observed using CRISPR-based approaches.

At the American Society of Cell and Gene Therapy annual meeting in May 2020, we presented *in vivo* data showing that *ex vivo* expansion with E478 led to significantly higher rate and number of NSG-engrafting gene-corrected cells.



E478 increases the dose of gene-corrected NSG-engrafting cells. Mobilized blood CD34+ cells from healthy subjects were pre-stimulated in cytokine-containing media followed by electroporation with CRISPR/Cas9 and AAV.GFP donor and expanded post-editing. Four day pre-stimulation followed by a four day expansion (called a 4+4 culture) compared to a conventional two day pre-stimulation period followed by a one day expansion (called a 2+1 culture). E478 was added to the 4+4 culture and compared to a conventional 2+1 culture with vehicle control. **(A)** Engraftment (frequency of human CD45+ cells); **(B)** rate of homology-directed repair, or HDR; and **(C)** number of engraftable HDR+ cells was measured in the peripheral blood at week 16 post-transplant. Bars represent median and each symbol represents an individual mouse (n=eight). Statistics were determined by a one-tailed Student's t-test.

Development plan

We are developing E478 specifically to partner with gene therapy, genome editing and cell therapy companies. E478 would be integrated into our potential partners' cell-based products, leading to newly defined cell/gene therapies.

Commercialization Plan

We plan to establish sales, marketing and commercial product distribution capabilities. As our product candidates advance in clinical development, we are building upon our existing relationships with transplant centers and thought leaders, furthering our understanding of the influences on the transplant decision-making process, refining our market research into reimbursement and market access and leveraging our partnership with Be the Match. Transplants are currently conducted in a small number of specialist sites worldwide. There are approximately 180 transplant centers in the U.S. that are accredited through Be the Match, of which 20% collectively account for over 50% of transplant volume. In Europe, approximately 275 transplant centers are accredited through the Joint Accreditation Committee ISCT-Europe-EMBT. All of our product candidates are focused on the transplant physician as the key prescriber and decision maker.

As we advance our development programs, we will evaluate our sales and marketing resource needs and develop plans to build out a dedicated transplant center-focused medical affairs, sales and marketing

organization. We intend to leverage any infrastructure developed for our lead product candidate, MGTA-145, to support commercialization of any additional product candidates in our portfolio for which we gain approval. In addition, we expect to build upon physicians' familiarity with MGTA-145 to accelerate adoption of our other potential products. As additional product candidates advance through our pipeline, our commercial plans may change. In particular, some of our discovery-stage pipeline assets target autoimmune disease indications, which could potentially require additional commercial resources in order to engage with referring physicians outside of transplant centers and clinical trial sites.

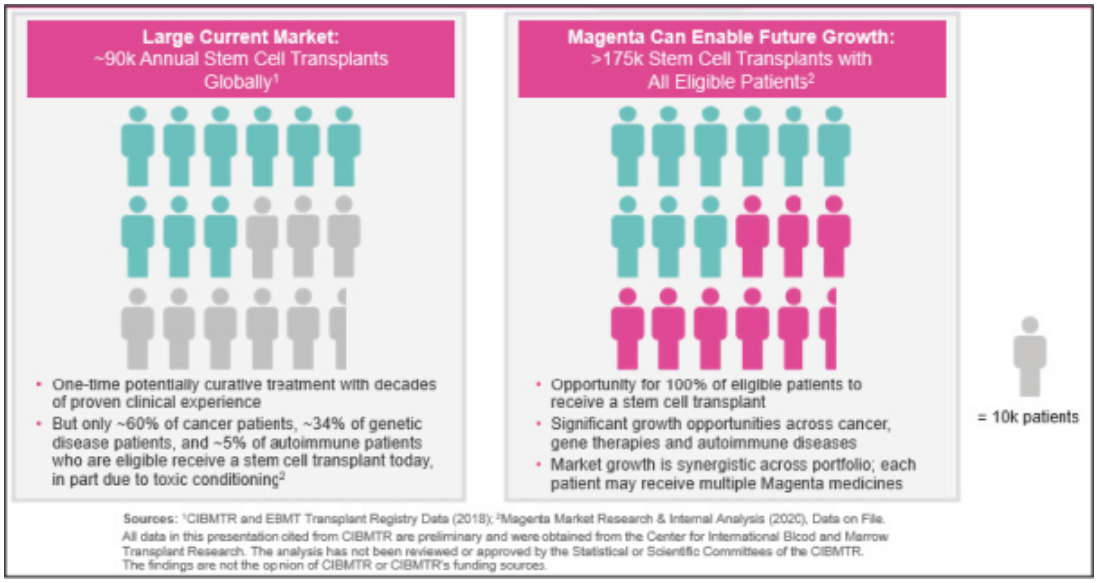
Our commercial strategy in the U.S., Europe, and Asia may include the use of strategic partners, distributors, a contract salesforce and/or the establishment of our own commercial structure.

Stem Cell Transplant Commercial Market Opportunity

Stem cell transplant is currently a large commercial market opportunity with approximately 90,000 procedures annually in the U.S., Europe and Asia. This is a significant existing potential market for Magenta medicines. However, this number represents only approximately 50% of the patient population that is eligible for stem cell transplant given the existing barriers and risks that can prevent eligible patients from proceeding to transplant.

At Magenta, we believe our portfolio of product candidates could not only improve upon existing approaches but also extend the curative power of stem cell transplant to more patients. Each of our product candidates is designed to address distinct unmet needs in the stem cell transplant patient journey. By using multiple Magenta products, physicians would be able to tailor the transplant procedure, thereby improving patient outcomes and increasing the potential for every eligible patient to benefit from stem cell transplant.

Across diseases where transplant has been shown to result in improved patient outcomes, only a fraction of eligible patients currently receives a transplant because the current risks and challenges associated with the drug products used to prepare patients often outweigh the potential for a cure. Depending on the disease, the barriers for treatment currently include the risk of morbidity and mortality associated with current conditioning regimens, efficiently obtaining an adequate cell dose to complete the transplant and finding a matched donor. We believe that by removing the major barriers to transplant with Magenta's programs, we can potentially enable safe and effective stem cell transplant for more of the 175,000 eligible patients worldwide. Further, by optimizing the benefit-risk tradeoff, we believe the eligible patient populations could increase beyond the current numbers.



We have assessed the existing stem cell transplant market and potential eligible patient population on a per-indication basis to estimate the potential number of patients that could benefit from Magenta's product candidates.

Blood Cancers: *Stem cell transplant is an existing standard of care for many diseases, however outcomes can be impacted by many factors, including lack of a matched donor or poor mobilization, and a significant number of eligible patients do not receive a transplant because of the toxicity of conditioning:*

Our MGTA-145 product candidate has the potential to address the challenges in mobilizing and collecting stem cells faced by patients and healthy donors for transplant in blood cancer patients. Our conditioning programs, including our MGTA-117 product candidate, have the potential to provide safer and more effective targeted conditioning for blood cancer patients, particularly allogeneic transplant candidates, who currently weight the tradeoffs of long-term efficacy and toxicity with current conditioning regimens that impact patient outcomes. Pending further development for the MGTA-456 program informed by ongoing data, MGTA-456 has the potential to offer allogeneic transplant recipients access to a well-matched cell therapy, with a high stem cell dose and the higher likelihood of durable clinical outcomes.

Multiple myeloma, a cancer arising from plasma cells, is diagnosed in approximately 64,000 patients annually in the major global markets: U.S., Germany, France, U.K., Italy, Spain and Japan. Multiple myeloma represents the second most common blood cancer treated by autologous stem cell transplant. Following diagnosis, patients typically undergo treatment with one or more therapeutic classes which may include chemotherapy, immunotherapy, targeted agents, and/or corticosteroids. After one or more courses of initial treatment, patients may proceed to a stem cell transplant depending on whether they are considered an appropriate candidate depending on several patient- and disease-related factors. Currently, approximately 15,300 multiple myeloma patients receive a stem cell transplant annually in the major global markets.

Non-Hodgkin's and Hodgkin's lymphomas, cancers arising from lymphocytes or white blood cells, are diagnosed in approximately 180,000 patients annually in the major global markets. Non-Hodgkin's lymphoma, or NHL is the most common group of blood cancers, the largest of which is Diffuse Large B-Cell Lymphoma, comprising approximately 33% of cases. Both major types of lymphomas can be treated by autologous stem cell transplant. Following diagnosis, patients typically undergo treatment with one or more therapeutic classes which may include chemotherapy, immunotherapy, cell therapy, targeted agents, and/or corticosteroids. After one or more courses of initial treatment, patients may proceed to a stem cell transplant depending on whether they are considered an appropriate candidate depending on several patient- and disease-related factors. Currently, approximately 10,500 lymphoma patients receive a stem cell transplant annually in the major global markets.

Acute myeloid leukemia, or AML, a cancer arising from myeloid cells, an immature white blood cell found in the bone marrow, is diagnosed in approximately 36,000 patients annually in the major global markets: U.S., Germany, France, U.K., Italy, Spain and Japan. Eligibility for a stem cell transplant is determined by several criteria including patient fitness (including age and comorbidities), cytogenetic risk status and response to induction therapy. Approximately 40% of newly diagnosed AML patients become eligible for transplant to achieve a more durable remission based on the criteria outlined. However, the current challenges of stem cell transplant, including highly toxic chemotherapy conditioning regimens, limit transplant to approximately 60% of those patients who are otherwise eligible. Currently, approximately 8,400 patients with AML receive a stem cell transplant annually in the major global markets.

Myelodysplastic syndrome, or MDS, occurs when the blood-forming cells in the bone marrow become abnormal, leading to low numbers of one or more types of blood cells. It is diagnosed in approximately 46,000 patients annually in the major global markets. Approximately 35% of newly diagnosed MDS patients have intermediate- to high-risk disease and one-third of those are eligible for stem cell transplant based on patient fitness (including age and comorbidities) and blast count. However, the current challenges of stem cell transplant, including highly toxic chemotherapy conditioning regimens, limit transplant to approximately 60% of those

MDS patients who are otherwise eligible. Currently, approximately 2,900 patients with MDS receive a stem cell transplant annually in the major global markets.

Acute lymphocytic leukemia, or ALL, is a cancer that develops from immature white blood cells and is common in children. It is diagnosed in approximately 11,000 patients annually in the major global markets. Currently, approximately 3,800 patients with ALL receive a stem cell transplant annually in the major global markets.

Hematopoietic Stem Cell-Based Gene Therapies: *Stem cell gene therapy is a promising treatment option but is limited by the same conditioning challenges as standard stem cell transplant, as the current standard of care, busulfan, has many risks including long-term infertility and secondary cancers. Additionally, all HSC-based gene therapy patients require a high dose of stem cells for gene modification, and sickle cell patients specifically have limited options and experience significant safety risks with current mobilization regimens.*

Our MGTA-145 product candidate has the potential to address patients with sickle cell disease who cannot receive G-CSF because of the risk of triggering sickle cell crises, as well as other patients requiring collection of stem cells prior to HSC-based gene therapy. Our MGTA-117 conditioning program has the potential to provide safer, targeted conditioning for patients who are eligible to receive autologous stem cell gene therapies, including but not limited to patients with sickle cell disease, beta thalassemia, and lysosomal storage disorders. MGTA-117 may also further expand the number of patients who are eligible for these currently investigational gene therapy product candidates. E478 uses the same clinically validated mechanism as MGTA-456 to generate higher doses of gene-modified stem cells.

Sickle cell disease affects over 100,000 patients in the U.S. and 50,000 patients in Germany, France, U.K., Italy and Spain. Approximately 50,000 of these patients have severe disease (based on annualized sickle cell crises) and are therefore eligible for stem cell transplant or gene therapy.

Beta-thalassemia affects approximately 7,500 patients in the U.S., 7,000 patients in Italy, and 2,600 patients in Germany, France, U.K., Spain and Japan annually. Approximately 70% of these patients, or 12,500 patients, have severe disease, or beta-thalassemia major, and are therefore eligible for stem cell transplant.

Autoimmune Diseases: *emerging data support use of stem cell transplant as a one-time therapy, however the high morbidity and mortality associated with current conditioning regimens limit the uptake of transplant as a therapeutic option.*

MGTA-145 product candidate has the potential to be the first product specifically indicated for the mobilization of autoimmune disease patients, without the risks associated with G-CSF. In addition, our C100 conditioning program has the potential to provide safer, targeted conditioning for autoimmune disease patients eligible to receive autologous transplant. We are developing targeted conditioning approaches to grow the use of transplant in autoimmune disease significantly.

Multiple sclerosis affects over 1 million patients worldwide and approximately 62,000 new patients are diagnosed annually in the major global markets. To assess current eligibility in this population, we focused on the patients with active relapsing-remitting disease and relapsing secondary progressive multiple sclerosis patients who are not adequately treated by current therapies. We believe this population represents more than 6,000 diagnosed severe multiple sclerosis patients annually who are eligible for stem cell transplant under current guidelines. Given stem cell transplant's proven ability to durably eliminate relapses and disease activity in multiple sclerosis patients, we believe a safe blood and immune reset would be a viable option for those patients with highly active disease beyond what therapeutics can manage. Currently fewer than 10% of eligible multiple sclerosis patients receive a stem cell transplant because the risk of the process outweighs the benefits of a potential cure, and we believe we can significantly expand this number.

Systemic sclerosis, or scleroderma, is a chronic connective tissue disease that is characterized by thickening of the skin. It affects over 245,000 patients and approximately 21,000 new patients are diagnosed annually in the

major global markets. Although 35% of scleroderma patients suffer from diffuse cutaneous disease and are therefore eligible for stem cell transplant today, currently fewer than 10% of eligible scleroderma patients receive a stem cell transplant. However, with the recent addition of stem cell transplant into the EULAR treatment guidelines for scleroderma and with the opportunity for a safer transplant procedure, we believe transplant would be a viable option for the severe scleroderma patient population who have no other therapeutic options available.

Manufacturing

We do not own or operate, and currently have no plans to establish, any manufacturing facilities. We currently depend on third-party contract manufacturing organizations, or CMOs, for all of our requirements of raw materials, drug substance and drug product for our preclinical research and our ongoing clinical trials of MGTA-145 and MGTA-456. We have not entered into long-term agreements with our current CMOs. We intend to continue to rely on CMOs for later-stage development and commercialization of MGTA-145, as well as the development and commercialization of MGTA-117 and other product candidates that we may identify. Although we rely on CMOs, we have personnel and consultants with extensive manufacturing experience to oversee the relationships with our contract manufacturers.

We believe the synthesis of the MGTA-145 drug substance used to manufacture drug product is reliable and reproducible from readily available starting materials, amenable to commercial-scale production, and does not require unusual equipment or handling in the manufacturing process. We have manufactured, and released for early clinical use, drug products which have been manufactured by our CMO to satisfy our immediate and near term clinical and preclinical needs. We expect to refine, scale, and optimize the process, including the final product formulation, for our development and commercial supply needs.

Our external manufacturing strategy enables us to more efficiently direct financial resources to the research, development, and commercialization of product candidates rather than diverting resources to internally develop manufacturing facilities. As our product candidates advance through development and commercialization, we expect to enter into longer-term commercial supply agreements with key suppliers and manufacturers to fulfill and secure the ongoing and planned preclinical, clinical, and, if our product candidates are approved for marketing, commercial supply needs for ourselves and our collaborators.

Manufacturing of any product candidate is subject to extensive regulations that impose various procedural and documentation requirements, which govern recordkeeping, manufacturing processes and controls, personnel, quality control and quality assurance, among others. We expect that all of our CMOs will manufacture MGTA-145 and MGTA-117 under current Good Manufacturing Practice, or cGMP, conditions. cGMP is a regulatory standard for the production of pharmaceuticals to be used in humans.

Competition

The biotechnology industry is extremely competitive in the race to develop new products and treatment modalities. While we believe we have significant competitive advantages with our expertise in transplant medicine, preclinical and clinical development expertise, our comprehensive approach to patient care and intellectual property position, we may face competition for our development programs from companies focused on traditional therapeutic modalities, such as small molecules and antibodies, as well as companies developing next-generation cell therapies. Competition is likely to come from multiple sources, including larger pharmaceutical companies, biotechnology companies and academia. For any products that we may ultimately commercialize, not only will we compete with any existing therapies and those therapies currently in development, we will have to compete with new therapies that may become available in the future. We believe we are the only company that is committed to addressing multiple major opportunities in stem cell transplant to revolutionize an entire field of medicine. We are building a comprehensive portfolio of novel therapeutic development programs to address multiple major unmet medical needs inherent to the existing stem cell transplant process, which distinguishes us from our competition.

Many of our competitors may have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, clinical trials, regulatory approvals and product marketing than we currently do. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs. Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies.

Stem cell transplant is used to treat a range of diseases and indications. We are aware of many companies that are developing therapeutics, including biologics, small molecules and CAR-T therapies that are directed to the treatment of blood cancers, genetic diseases and autoimmune diseases that overlap with current stem cell transplant indications. The following competitive overview is focused on companies that are developing technologies to improve the distinct steps of stem cell transplant.

Competitors for our mobilization program include the following:

- BioLineRx Ltd., which is developing BL-8040, a peptide that functions as a high-affinity antagonist for CXCR4; and
- Yifan Pharmaceutical Co., Ltd., which is developing YF-H-2015005, a peptide that functions as a high-affinity antagonist for CXCR4.

Competitors for our conditioning programs include the following:

MGTA-117 targeted conditioning program:

- Jasper Therapeutics, Inc., which is developing an antibody to CD117 that is not conjugated to any toxin; and
- Gilead Sciences, Inc., which is developing an antibody to CD117 that is not conjugated to any toxin and is used in combination with an antibody to CD47.

C100 program (CD45-ADC):

- Actinium Pharmaceuticals, Inc., which is developing an antibody to CD45 that is linked to radioisotope iodine-131; and
- Molecular Templates Inc., which is developing an antibody to CD45 that is conjugated to engineered Shiga-toxin.

C300 program:

- Allogene Therapeutics, Inc., which is developing an antibody to CD52 that is not conjugated to any toxin.

G100 program:

- Incyte Corporation, which has a Janus kinase inhibitor, ruxolitinib, that is approved for the treatment of steroid-refractory acute GvHD, and is developing two Janus kinase inhibitors, ruxolitinib and itacitinib, for the treatment of chronic GvHD;
- Bristol Myers Squibb Company, which is developing a selective T-cell co-stimulation inhibitor, abatacept, for the prevention of acute GvHD;
- Sanofi S.A., which is developing an antibody to CD52, alemtuzumab, for the prevention of acute GvHD;
- Mesoblast Ltd., which is developing a cellular therapy, remestemcel-L, composed of *ex vivo*-expanded mesenchymal stromal cells, for the treatment of acute GvHD;

- Abbvie Inc., which has a Bruton's tyrosine kinase inhibitor, ibrutinib, that is approved for use in steroid-refractory chronic GvHD;
- Kadmon Holdings, Inc., which is developing a Rho-associated kinase 2 (ROCK2) inhibitor, belumosudil, for the treatment of steroid-refractory chronic GvHD; and
- Bellicum Pharmaceuticals, Inc., which is developing a cellular therapy composed of genetically modified allogeneic T-cells with the activator agent rimiducid, for the prevention of GvHD.

Competitors for our cell therapy programs include the following:

- Intellia Therapeutics, Inc., which has exclusively licensed from Novartis the AHR antagonist that we use to manufacture MGTA-456 for expansion of gene-modified HSCs only;
- Gamida Cell Ltd., which is developing a UCB-derived cell product that uses a small molecule to inhibit differentiation and enhance functionality of *ex vivo*-expanded HSCs;
- ExCellThera Inc., which is focused on *ex vivo* expansion of stem cells using a pyrimidoindole-derivative small molecule; and
- Angiocrine Bioscience, Inc., which is expanding cord blood and gene-modified HSCs using an endothelial cell feeder layer.

Licenses and Collaborations

Alliance with Novartis

In April 2017, we entered into a license agreement with Novartis pursuant to which Novartis granted us an exclusive, worldwide, sublicensable license to research, develop and commercialize certain licensed products that contain Novartis compounds for the expansion of cord blood derived non-Gene-Edited/-Modified HSCs. We refer to this agreement as the Novartis Agreement. The license granted to us under the Novartis Agreement is subject to certain rights retained by Novartis for internal research purposes and certain third parties for research and educational purposes. Certain of the rights licensed to us under the Novartis Agreement are also subject to any retained rights of the U.S. government in the licensed patents. The Novartis Agreement led to the establishment of MGTA-456 as one of our programs. Under the terms of the Novartis Agreement, we are responsible for all research, development, regulatory and commercialization activities related to licensed products. We are required to use commercially reasonable efforts to develop and commercialize licensed products in the U.S., United Kingdom, France, Germany, Spain, Italy and Japan.

Pursuant to the Novartis Agreement, we issued to Novartis 2,500,000 shares of Series A preferred stock and 643,550 shares of Series B preferred stock. We will be required to make milestone payments to Novartis upon dosing the first patient in Biologic Licensing Application, or BLA, enabling clinical trials and upon regulatory approvals of licensed products across ultra-orphan, hemoglobinopathies and other indications. For ultra-orphan indications, we may be required to pay development and regulatory milestones of up to $13.0 million for each of the first two indications, and up to $5.0 million for a third indication. For hemoglobinopathies, we may be required to pay development and regulatory milestones of up to $13.0 million per indication, for the first two indications. For all other indications that are not an ultra-orphan or hemoglobinopathy, we may be required to pay development and regulatory milestones of up to $75.0 million for the first indication and up to $45.0 million for the second indication. Across all licensed products, we may be required to pay Novartis up to $125.0 million in sales milestones, based on the first achievement of certain aggregate worldwide annual net sales thresholds. We are also required to pay tiered royalties to Novartis on worldwide net sales of licensed products by us, ranging from low single-digit percentages to up to 20% for higher net sales, which royalties are potentially subject to reduction and offset during the royalty term. Royalties are payable on a licensed product-by-licensed product and country-by-country basis until the later of (i) expiration of the last valid claim of a licensed patent right that covers the manufacture, use or sale of such licensed product, or the licensed compound used in the manufacture of such licensed product, in such country and (ii) ten years following the first commercial sale of such licensed product in such country.

Novartis controls the filing, prosecution, maintenance and enforcement of the licensed patent rights at its expense. We have the right to assume these responsibilities should Novartis not wish to pursue them. We own all rights in any intellectual property related to the licensed compound or licensed products that we solely develop under the Novartis Agreement. The Novartis Agreement does not otherwise allocate ownership of improvements developed thereunder; however, Novartis grants us a non-exclusive, royalty-free license to practice any improvements that Novartis owns under the Novartis Agreement in connection with non-gene-edited/-modified HSCs, and we grant a non-exclusive, royalty-free license to Novartis to practice any improvements that we own under the agreement outside of such field.

The Novartis Agreement will continue until the last-to-expire royalty term for a licensed product unless terminated earlier by either party. Each party may terminate the Novartis Agreement due to the other party's insolvency or uncured breach of a material obligation. We have the right to terminate the Novartis Agreement in its entirety or on a product-by-product or country-by-country basis for convenience upon 90 days' prior written notice to Novartis. Upon termination of the Novartis Agreement by us for convenience or by Novartis for cause, the license granted to us by Novartis will terminate and we will grant a worldwide, perpetual, non-exclusive license to Novartis to develop and commercialize the licensed products under any intellectual property that we (i) control and used in the development, manufacture or commercialization of licensed products or (ii) developed under the agreement to develop and commercialize the licensed products.

Collaboration with National Marrow Donor Program (as successor in interest to Be The Match Biotherapies, LLC)

In November 2017, we entered into a collaboration agreement with Be The Match BioTherapies, LLC, then a subsidiary of National Marrow Donor Program, or NMDP. We refer to this agreement, as amended, as the NMDP Agreement. Pursuant to the NMDP Agreement, the NMDP grants us priority access to subject matter experts at the NMDP and the CIBMTR, which is an affiliation between the Medical College of Wisconsin and NMDP, for consultation on our clinical development and commercialization needs.

We believe that, through this priority access, the partnership enables us to establish relationships across transplant centers and with transplant physicians, giving us access to clinical strategy and development operational support, and potentially supporting our eventual commercialization efforts across several programs.

Under the NMDP Agreement, we will make quarterly payments to NMDP of $17,500. The term of the NMDP Agreement will continue until December 31, 2021 unless terminated earlier by either party. Either party may terminate the NMDP Agreement in whole or in part (i) for convenience upon 60 days' notice, (ii) for the other party's uncured material breach upon ten days' notice or (iii) upon the other party's insolvency.

Harvard University License Agreement

In November 2016, we entered into a license agreement with Harvard University, or Harvard, pursuant to which Harvard granted us the worldwide exclusive, subject to Harvard's retained right solely for research and educational purposes, sublicensable, right, to research, develop and commercialize licensed products under certain conditioning-related and mobilization-related patents. The license granted to us under the Harvard Agreement is also subject to any retained rights of the U.S. government in the licensed patents. Under the terms of the agreement, which we refer to as the Harvard Agreement, we will be responsible for all research, development, regulatory and commercialization activities related to licensed products. We are obligated to use commercially reasonable efforts to commercialize at least two licensed products under the Harvard Agreement, including one for conditioning and one for mobilization. The license from the Harvard Agreement relates to our conditioning and mobilization programs.

Pursuant to the Harvard Agreement, we made an upfront payment to Harvard of $85,000 and issued to Harvard and the other co-owners of the licensed patent rights (The General Hospital Corporation d/b/a

Massachusetts General Hospital, and Children's Medical Center Corporation) 385,063 shares of our common stock. In addition, we reimbursed Harvard for approximately $300,000 in expenses incurred by Harvard in connection with the licensed patent rights. Harvard is also entitled to receive an annual license maintenance fee of $25,000 for each calendar year through 2019 and $50,000 for each calendar year thereafter until expiration or termination of the Harvard Agreement.

Harvard is entitled to payments upon certain development and regulatory milestones for the first two licensed products of up to $7.4 million per licensed product. In addition, we must pay Harvard low-single digit royalties on net sales of licensed products. If we or our affiliates or sublicensees under the Harvard Agreement commence a legal action to challenge the validity, enforceability or scope of any licensed patents, the royalty rate payable to Harvard will double during the pendency of such proceeding and will remain double thereafter if such action is determined in Harvard's favor. Depending on the type of licensed product, royalties are payable on a product-by-product and country-by-country basis until the later of (i) the last to expire valid claim in the applicable country covering or claiming the composition, manufacture, sale or use of such licensed product and (ii) 12 years from the date of the first commercial sale of such licensed product in such country.

Harvard controls the filing, prosecution and maintenance of the licensed patent rights at our expense. We have the first right, but not the obligation, to enforce licensed patent rights against third-party infringement.

The term of the Harvard Agreement will continue until the later of (i) the expiration of the last to expire valid claim under a licensed patent, and (ii) the expiration of the last royalty period Each party has the right to terminate the Harvard Agreement due to the other party's uncured material breach or insolvency. In particular, Harvard may terminate the Harvard Agreement upon our uncured failure to meet certain development and regulatory milestone deadlines set forth therein. We have the right to terminate the Harvard Agreement for convenience upon 60 days' prior written notice to Harvard. Upon termination of the Harvard Agreement for any reason, the license granted to us by Harvard will terminate.

Research, Development Option and License Agreement with Heidelberg Pharma Research GmbH

In March 2018, we entered into an exclusive research, development option and license agreement with Heidelberg Pharma Research GmbH, or Heidelberg Pharma. We refer to this agreement, as amended, as the Heidelberg Agreement. Heidelberg Pharma has developed a proprietary antibody targeted amanitin conjugates platform. This collaboration enables our research and development efforts across several targeted conditioning programs through the combination of our proprietary antibodies and Heidelberg Pharma's antibody targeted amanitin conjugates platform.

Under the terms of the Heidelberg Agreement, Heidelberg Pharma has granted to us a worldwide, non-exclusive research license for a one-year period with respect to certain targets set forth in an agreed-to research plan. We have the option to extend such license for up to an additional three years. We also have an option to obtain an exclusive target-specific research license, which would expire two years after the exercise of such option. In addition, we will have an option to obtain a target-specific exclusive license for global development and commercialization rights to each of the product candidates resulting from the research collaboration. We may obtain such exclusive target-specific rights to up to four targets. We are required to use commercially reasonable efforts to perform our research activities under the Heidelberg Agreement and, if we exercise our right to obtain a development and commercialization license, we are required to use commercially reasonable efforts to pursue development and commercialization of a product directed to the applicable target.

In addition, we granted Heidelberg Pharma a worldwide, non-exclusive license under all of our patents and know-how, and any improvements of the foregoing developed under the Heidelberg Agreement, that are reasonably necessary or useful for Heidelberg Pharma to perform its research activities under the Heidelberg Agreement. In addition, we grant Heidelberg Pharma a worldwide, royalty-free, non-exclusive license under all joint improvements developed under the Heidelberg Agreement for non-clinical research purposes only.

Payment terms to Heidelberg Pharma include an upfront technology access fee, research exclusivity fees with respect to the two initial targets, and payments for research support. Heidelberg Pharma is entitled to additional fees of between $50,000 and $1.1 million in the aggregate if we extend the initial research license or if we exercise our research exclusivity options with respect to additional targets. Upon our exercise of an option for an exclusive development and commercialization license, with respect to a target, we are required to make a low single digit million-dollar payment to Heidelberg Pharma for each exercised option. In addition, we may be required to pay development, regulatory and commercial milestones totaling up to approximately $83.5 million per target. We will pay Heidelberg Pharma mid-single digit royalties on a country-by-country and product-by-product basis, on worldwide net product sales of licensed products. Royalties are payable on a licensed product-by-licensed product and country-by-country basis until the later of (i) expiration of the last valid claim of a licensed patent right that covers the use, import, offering for sale, or sale of such licensed product in such country, and (ii) ten years following the first commercial sale of such licensed product in such country. We have the option to buy-down royalties at certain points during the development path of each product.

Heidelberg Pharma will own all improvements solely related to the intellectual property rights Heidelberg Pharma licensed to us under the Heidelberg Agreement. We will own all improvements solely related to the intellectual property rights that we licensed to Heidelberg Pharma and all other intellectual property rights developed under the Heidelberg Agreement for which ownership is not otherwise allocated.

Heidelberg Pharma controls the filing, prosecution, maintenance and enforcement of the intellectual property that it licenses to us under the Heidelberg Agreement. We have the right to enforce such licensed intellectual property against infringement if the infringement is competitive with our licensed products and Heidelberg Pharma does not pursue enforcement. We control the filing, prosecution, maintenance and enforcement of the intellectual property we license to Heidelberg Pharma under the Heidelberg Agreement.

The term of the Heidelberg Agreement will continue until the last to expire royalty term unless terminated earlier by either party. Each party has the right to terminate the Heidelberg Pharma Agreement due to the other party's uncured material breach or insolvency on a product-by-product or target-by-target basis. We have the right to terminate the Heidelberg Agreement for convenience in its entirety or on a product-by-product, target-by-target or country-by-country basis upon 60 days' prior written notice to Heidelberg Pharma if terminating before the first commercial sale of a product in a country or upon six months' prior written notice to Heidelberg Pharma if terminating after the first commercial sale of any product directed to such target in such country.

Upon termination of the Heidelberg Agreement in its entirety or with respect to a product or target, all applicable licenses granted to us will terminate immediately.

Bachem Master Development and Manufacturing Agreement

In February 2018, we entered into a Master Development and Manufacturing Agreement with Bachem Americas, Inc., or Bachem. This agreement, which we refer to as the Bachem Agreement, governs several projects related to the development and manufacture of CXCR2 agonists, including MGTA-145, each pursuant to a separate project plan. The active pharmaceutical ingredient of MGTA-145 is a 69 amino acid protein. We selected Bachem as our contract manufacturer for this program based on their deep expertise in the synthesis and production of proteins. Financial terms related to this agreement will be determined on a project-by-project basis. In April 2018, we entered into an initial one-year project plan pursuant to which Bachem will be responsible for producing batches of MGTA-145 for GLP toxicology studies completed in 2018, as well as GMP material for the Phase 1 trial of MGTA-145, which commenced in the second quarter of 2019.

The term of the Bachem Agreement is initially five years and will be automatically renewed for one-year periods unless either party provides the other with written notice of nonrenewal at least three months prior to expiry. Each party may terminate the agreement upon a material uncured breach of the other party. During the

term, Bachem will be restricted from producing a pre-defined set of agonists, including MGTA-145, for clinical or commercial use by any third party without our prior written consent, as long as Bachem remains our primary supplier of CXCR2 agonists. Each project plan may be terminated independently of the agreement as a whole.

Clinical Trial Agreement with University of Minnesota

In January 2018, we entered into a Clinical Trial Agreement with the Regents of the University of Minnesota, or UMinn, pursuant to which UMinn will undertake a Phase 2 clinical trial with MGTA-456 for the treatment of inherited metabolic disorders. Under this agreement, UMinn is also responsible for the manufacture and supply of the required quantities of MGTA-456 for the trial, subject to specified quality assurance provisions.

The term of the agreement will run through the course of the trial, unless earlier terminated. Each party may terminate the agreement immediately upon the other party's material failure to follow the specified protocol for the trial or upon a material uncured breach by the other party.

Intellectual Property

Overview

We strive to protect the proprietary product candidates and technologies that we believe are important to our business, including seeking and maintaining patent protection intended to cover the composition of matter of our product candidates, their methods of use, related technologies, diagnostics and other inventions. As of December 31, 2020, our owned patent portfolio is composed of more than 10 issued patents and more than 200 pending patent applications in the U.S. and foreign jurisdictions. In addition, we have licensed more than 200 issued patents and pending patent applications in the U.S. and foreign jurisdictions.

Company-Owned Patent Rights Relating to Our Targeted Conditioning and Post-Transplant Complications Programs

With regard to our targeted conditioning and post-transplant complications programs, our owned patent portfolio includes approximately five issued U.S. patents, approximately four issued foreign patents, and more than 140 pending patent applications in the U.S. and foreign jurisdictions. Our targeted conditioning and post-transplant complications patent portfolio includes, for example, composition of matter and methods of use claims directed to program-specific ADCs and antibodies, as well as claims directed more generally to our targeted conditioning and post-transplant complications programs that provide coverage for multiple programs.

Our CD117 patent portfolio contains patent families that we own covering compositions and methods for the depletion of CD117+ cells and includes patent families that cover the MGTA-117 composition of matter and methods of use. As of December 31, 2020, our CD117 patent portfolio includes one issued U.S. patent, approximately eight pending U.S. patent applications, two issued Australian patents, more than 40 pending patent applications in foreign jurisdictions, approximately three families of pending U.S. provisional patent applications, and approximately seven pending PCT applications. The issued U.S. patent and the issued Australian patents would be expected to expire in 2037, absent any applicable patent term extensions. Any other patents that issue from the pending patent applications in this portfolio would be expected to expire between 2037 and 2041, absent any applicable patent term extensions.

Company-Owned Patent Rights Relating to Our Mobilization Program

Our MGTA-145 patent portfolio contains patent families directed to methods of mobilizing HSCs. As of December 31, 2020, we owned one issued U.S. patent, approximately three pending U.S. patent applications, more than 15 pending foreign patent applications, and one pending PCT patent application. The issued U.S.

patent would be expected to expire in 2037, absent any applicable patent term extensions. Any other patents that issue from the pending patent applications would be expected to expire between 2037 and 2040, absent any applicable patent term extensions.

Company-Owned Patent Rights Relating to Our Cell Therapy Programs

Our cell therapy patent portfolio contains patent families directed to compositions of matter for AHR antagonists, including E478, methods of using these compounds, and methods of treatment using expanded HSCs. As of December 31, 2020, we owned two issued U.S. patents, approximately five pending U.S. patent applications, more than 30 pending patent applications in foreign jurisdictions, and approximately three pending PCT patent applications. The issued U.S. patents would be expected to expire in 2038, absent any applicable patent term extensions. Any patents that issue from the pending patent applications would be expected to expire between 2038 and 2039, absent any applicable patent term extensions.

In-Licensed Harvard Portfolio

We have exclusively licensed a patent portfolio from Harvard applicable to our targeted conditioning and mobilization programs that contains patent families directed to compositions and methods for non-myeloablative conditioning, compositions and methods for mobilizing HSCs, and highly engraftable hematopoietic stem cells and their uses. As of December 31, 2020, this patent portfolio includes two issued U.S. patents, approximately six pending U.S. patent applications, and more than 20 pending patent applications in foreign jurisdictions. The issued U.S. patents would be expected to expire in 2036, absent any applicable patent term extensions. Any patents that issue from the pending patent applications in this patent portfolio would be expected to expire between 2034 and 2037, absent any applicable patent term extensions.

In-Licensed Heidelberg Portfolio

We have licensed a patent portfolio from Heidelberg Pharma applicable to our targeted conditioning and post-transplant complications programs that contains patent families directed to amatoxin conjugates, methods of treatment, and methods of synthesizing amatoxins. As of December 31, 2020, these families include more than 90 issued patents and pending patent applications in jurisdictions worldwide. The issued patents and any other patents that issue from these families would be expected to expire between 2030 and 2040, absent any applicable patent term extensions.

In-Licensed Novartis Portfolio

We have licensed a patent family from Novartis applicable to our MGTA-456 program that is directed to AHR antagonists and their use in the expansion of HSCs. As of December 31, 2020, this family includes two issued U.S. patents, one with method claims covering the use of AHR antagonists in the expansion of HSCs and one with composition of matter claims covering AHR antagonists, two pending U.S. patent applications, and more than 80 issued patents and pending patent applications in jurisdictions worldwide. The issued U.S. patents are expected to expire in 2032 and 2031, respectively, absent any applicable patent term extensions. The issued foreign patents and any patents that may issue from U.S. and foreign pending patent applications in this family would be expected to expire in 2029, absent any applicable patent term extensions.

The term of individual patents depends upon the legal term for patents in the countries in which they are obtained. In most countries in which we have filed, including the U.S., the patent term is 20 years from the earliest filing date of a non-provisional patent application. In the U.S., a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the U.S. Patent and Trademark Office in examining and granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier filed patent. The term of a patent that covers a drug or biological product may also be eligible for patent term extension when FDA approval is granted for a portion of the term effectively lost as a result of the

FDA regulatory review period, subject to certain limitations and provided statutory and regulatory requirements are met. Any such patent term extension can be for no more than five years, only one patent per approved product can be extended, the extension cannot extend the total patent term beyond 14 years from approval, and only those claims covering the approved drug, a method for using it or a method for manufacturing it may be extended. We may not receive an extension if we fail to exercise due diligence during the testing phase or regulatory review process, fail to apply within applicable deadlines, fail to apply prior to expiration of relevant patents or otherwise fail to satisfy applicable requirements. Moreover, the length of the extension could be less than we request. In the future, if and when our product candidates receive approval from the FDA or foreign regulatory authorities, we expect to apply for patent term extensions on issued patents we may obtain in the future covering those products, depending upon the length of the clinical trials for each product and other factors. There can be no assurance that any of our pending patent applications will issue or that we will benefit from any patent term extension or favorable adjustment to the term of any of our patents.

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

Other IP Rights

In addition to patents, we rely upon unpatented trade secrets and know-how and continuing technological innovation to develop and maintain our competitive position. However, trade secrets and know-how can be difficult to protect. We seek to protect our proprietary information, in part, by executing confidentiality agreements with our collaborators and scientific advisors, and non-competition, non-solicitation, confidentiality, and invention assignment agreements with our employees and consultants. We have also executed agreements requiring assignment of inventions with selected scientific advisors and collaborators. The confidentiality agreements we enter into are designed to protect our proprietary information and the agreements or clauses requiring assignment of inventions to us are designed to grant us ownership of technologies that are developed through our relationship with the respective counterparty. We cannot guarantee, however, that we have executed such agreements with all applicable counterparties, such agreements will not be breached, or that these agreements will afford us adequate protection of our intellectual property and proprietary rights. For more information, see the section entitled “Risk Factors—Risks Related to Intellectual Property”.

Trademarks

We have filed and obtained trademark protection for the MAGENTA THERAPEUTICS character mark and service mark logo for pharmaceutical research and development services and biochemical research and development services. We have also filed for trademark protection for the #THECOLOROFCURE character mark for promoting public awareness of medical disorders and their treatment, promoting public awareness of bone marrow diseases, cancer, tumors, infectious diseases, autoimmune diseases and related diseases and disorders, providing a website featuring medical information, and providing medical information. We plan to register trademarks in connection with our future products.

Governmental Regulation

Compliance with various governmental regulations has an impact on our business, including our capital expenditures and competitive position, which can be material. We incur costs to monitor and take actions to comply with governmental regulations that are applicable to our business, which include, among others, federal securities laws and regulations, applicable stock exchange requirements, tax laws and regulations, environmental and health and safety laws and regulations and the regulations that govern our products and drug discovery efforts. Government authorities in the U.S. at the federal, state and local level and in other countries extensively regulate, among other things, the research, development, testing, manufacture, quality control, approval, labeling, packaging, storage, record-keeping, promotion, advertising, distribution, post-approval monitoring and reporting, marketing and export and import of drug and biological products, such as MGTA-145 and any other current or future product candidates. Generally, before a new drug or biologic can be marketed, considerable data demonstrating its quality, safety and efficacy must be obtained, organized into a format specific for each regulatory authority, submitted for review and approved by the regulatory authority.

In addition to the discussion below, see “Item 1A—Risk Factors” for a discussion of material risks to us, including, to the extent material, to our competitive position, relating to governmental regulations, and see “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operation” together with our consolidated financial statements, including the related notes included therein, for a discussion of material information relevant to an assessment of our financial condition and results of operations, including, to the extent material, the effects that compliance with governmental regulations may have upon our capital expenditures.

U.S. drug development

In the U.S., the FDA regulates drugs under the Federal Food, Drug, and Cosmetic Act, or FDCA, and its implementing regulations and biologics under the FDCA, the Public Health Service Act, or PHSA, and their implementing regulations. Both drugs and biologics also are subject to other federal, state and local statutes and regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, and local statutes and regulations requires the expenditure of substantial time and financial resources. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or post-market may subject an applicant to administrative or judicial sanctions. These sanctions could include, among other actions, the FDA’s refusal to approve pending applications, withdrawal of an approval, a clinical hold, untitled or warning letters, product recalls or market withdrawals, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, restitution, disgorgement and civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us.

MGTA-145 and any other current or future product candidates must be approved by the FDA through either a New Drug Application, or NDA, or a Biologics License Application, or BLA, process before they may be legally marketed in the U.S. The process generally involves the following:

- completion of extensive preclinical studies in accordance with applicable regulations, including studies conducted in accordance with good laboratory practice, or GLP, requirements;
- submission to the FDA of an application for an IND application, which must become effective before human clinical trials may begin;
- approval by an institutional review board, or IRB, or independent ethics committee at each clinical trial site before each trial may be initiated;
- performance of adequate and well-controlled human clinical trials in accordance with applicable IND regulations, good clinical practice, or GCP, requirements and other clinical trial-related regulations to establish the safety and efficacy of the investigational product for each proposed indication;

- submission to the FDA of an NDA or BLA;
- a determination by the FDA within 60 days of its receipt of an NDA or BLA to accept the filing for review;
- satisfactory completion of an FDA pre-approval inspection of the manufacturing facility or facilities where the drug or biologic will be produced to assess compliance with current good manufacturing processes, or cGMP, requirements to assure that the facilities, methods and controls are adequate to preserve the drug or biologic's identity, strength, quality and purity;
- potential FDA audit of the clinical trial sites that generated the data in support of the NDA or BLA; and
- FDA review and approval of the NDA or BLA, including consideration of the views of any FDA advisory committee, prior to any commercial marketing or sale of the drug or biologic in the U.S.

The preclinical and clinical testing and approval process requires substantial time, effort and financial resources, and we cannot be certain that any approvals for MGTA-145 and any other current or future product candidates will be granted on a timely basis, or at all.

Preclinical studies and IND

Preclinical studies include laboratory evaluation of product chemistry and formulation, as well as *in vitro* and animal studies to assess safety and, in some cases, to establish a rationale for therapeutic use. The conduct of preclinical studies is subject to federal regulations and requirements, including GLP regulations for safety/toxicology studies.

An IND sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and plans for clinical trials, among other things, to the FDA as part of an IND. An IND is a request for authorization from the FDA to administer an investigational product to humans and must become effective before human clinical trials may begin. Some long-term preclinical testing, such as animal tests of reproductive adverse events and carcinogenicity, may continue after the IND is submitted. An IND automatically becomes effective 30 days after receipt by the FDA, unless before that time, the FDA raises concerns or questions related to one or more proposed clinical trials and places the trial on clinical hold. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. As a result, submission of an IND may not result in the FDA allowing clinical trials to commence.

Clinical trials

The clinical stage of development involves the administration of the investigational product to healthy volunteers or patients under the supervision of qualified investigators, generally physicians not employed by or under the trial sponsor's control, in accordance with GCP requirements, which include the requirement that all research subjects provide their informed consent for their participation in any clinical trial. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject selection and exclusion criteria, and the parameters to be used to monitor subject safety and assess efficacy. Each protocol, and any subsequent amendments to the protocol, must be submitted to the FDA as part of the IND. Furthermore, each clinical trial must be reviewed and approved by an IRB for each institution at which the clinical trial will be conducted to ensure that the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the informed consent form that must be provided to each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed. There also are requirements governing the reporting of ongoing clinical trials and completed clinical trial results to public registries.

A sponsor who wishes to conduct a clinical trial outside of the U.S. may, but often need not, obtain FDA authorization to conduct the clinical trial under an IND. If a foreign clinical trial is not conducted under an IND, the sponsor may submit data from the clinical trial to the FDA in support of an NDA or BLA. The FDA will accept a well-designed and well-conducted foreign clinical trial not conducted under an IND if the trial was conducted in accordance with GCP requirements, and the FDA is able to validate the data through an onsite inspection if deemed necessary.

Clinical trials are generally conducted in three sequential phases, known as Phase 1, Phase 2 and Phase 3, and may overlap.

- Phase 1 clinical trials generally involve a small number of healthy volunteers or disease-affected patients who are initially exposed to a single dose and then multiple doses of the product candidate. The primary purpose of these clinical trials is to assess the metabolism, pharmacologic action, side effect tolerability and safety of the drug.
- Phase 2 clinical trials involve studies in disease-affected patients to determine the dose required to produce the desired benefits. At the same time, safety and further pharmacokinetic and pharmacodynamic information is collected, possible adverse effects and safety risks are identified, and a preliminary evaluation of efficacy is conducted.
- Phase 3 clinical trials generally involve a large number of patients at multiple sites and are designed to provide the data necessary to demonstrate the product candidate's safety and effectiveness for its intended use, and to establish the overall benefit/risk relationship of the product and provide an adequate basis for product labeling.

Post-approval trials, sometimes referred to as Phase 4 clinical trials, may be conducted after initial marketing approval. These trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication. In certain instances, the FDA may mandate the performance of Phase 4 clinical trials as a condition of approval of an NDA or BLA.

Progress reports detailing the results of the clinical trials, among other information, must be submitted at least annually to the FDA and written IND safety reports must be submitted to the FDA and the investigators for serious and unexpected suspected adverse events, findings from other studies, animal or *in vitro* testing that suggest a significant risk for human subjects and any clinically important increase in the rate of a serious suspected adverse reaction compared to that listed in the protocol or investigator brochure.

Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, if at all. The FDA or the sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the drug or biologic has been associated with unexpected serious harm to patients. Additionally, some clinical trials are overseen by an independent group of qualified experts organized by the clinical trial sponsor, known as a data safety monitoring board or committee. This group provides authorization for whether a trial may move forward at designated check points based on access to certain data from the trial. Concurrent with clinical trials, companies usually complete additional animal studies, must develop additional information about the chemistry and physical characteristics of the drug or biologic and 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 and, among other things, companies 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 candidates do not undergo unacceptable deterioration over their shelf life.

NDA/BLA and FDA review process

Following completion of the clinical trials, data are analyzed to assess whether the investigational product is safe and effective for the proposed indicated use or uses. The results of preclinical studies and clinical trials are then submitted to the FDA as part of an NDA or BLA, along with proposed labeling, chemistry and manufacturing information to ensure product quality and other relevant data. The NDA or BLA is a request for approval to market the drug or biologic for one or more specified indications and must contain proof of safety and efficacy for a drug or safety, purity and potency for a biologic. The application may include both negative and ambiguous results of preclinical studies and clinical trials, as well as positive findings. Data may come from company-sponsored clinical trials intended to test the safety and efficacy of a product's use or from a number of alternative sources, including studies initiated by investigators. To support marketing approval, the data submitted must be sufficient in quality and quantity to establish the safety and efficacy of the investigational product to the satisfaction of the FDA. FDA approval of an NDA or BLA must be obtained before a drug or biologic may be marketed in the U.S.

Under the Prescription Drug User Fee Act, or PDUFA, as amended, each NDA or BLA must be accompanied by a user fee. The FDA adjusts the PDUFA user fees on an annual basis. According to the FDA's fee schedule, effective through September 30, 2021, the user fee for an application requiring clinical data, such as an NDA or BLA, is $2,875,842. The sponsor of an approved NDA or BLA is also subject to an annual prescription drug program fee, which for fiscal year 2021 is $336,432. Fee waivers or reductions are available in certain circumstances, including a waiver of the application fee for the first application filed by a small business. Additionally, no user fees are assessed on NDAs or BLAs for products designated as orphan drugs, unless the product also includes a non-orphan indication.

The FDA reviews all submitted NDAs and BLAs before it accepts them for filing and may request additional information rather than accepting the NDA or BLA for filing. The FDA generally makes a decision on accepting an NDA or BLA for filing within 60 days of receipt. Once the submission is accepted for filing, the FDA begins an in-depth review of the NDA or BLA. Under the goals and policies agreed to by the FDA under PDUFA, the FDA has ten months from the filing date to complete its initial review of a new molecular-entity NDA or original BLA and respond to the applicant, and six months from the filing date of a new molecular-entity NDA or original BLA designated for priority review. The FDA does not always meet its PDUFA goal dates for standard and priority NDAs or BLAs, and the review process is often extended by FDA requests for additional information or clarification.

Before approving an NDA or BLA, the FDA will conduct a pre-approval inspection of the manufacturing facilities for the new product to determine whether they comply with cGMP requirements. The FDA will not approve the product unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and are adequate to assure consistent production of the product within required specifications. The FDA also may audit data from clinical trials to ensure compliance with GCP requirements. Additionally, the FDA may refer applications for novel drug products or drug products which present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation, and a recommendation as to whether the application should be approved and under what conditions, if any. The FDA is not bound by recommendations of an advisory committee, but it considers such recommendations when making decisions on approval. The FDA likely will reanalyze the clinical trial data, which could result in extensive discussions between the FDA and the applicant during the review process. After the FDA evaluates an NDA or BLA, it will issue an approval letter or a Complete Response Letter. An approval letter authorizes commercial marketing of the drug or biologic with specific prescribing information for specific indications. A Complete Response Letter indicates that the review cycle of the application is complete, and the application will not be approved in its present form. A Complete Response Letter usually describes all of the specific deficiencies in the NDA or BLA identified by the FDA. The Complete Response Letter may require additional clinical data, additional pivotal Phase 3 clinical trial(s) and/or other significant and time-consuming requirements related to clinical trials, preclinical studies or manufacturing. If a Complete Response Letter is issued, the applicant may either resubmit the NDA or BLA, addressing all of the deficiencies

identified in the letter, or withdraw the application. Even if such data and information are submitted, the FDA may decide that the NDA or BLA does not satisfy the criteria for approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data.

Orphan drug designation

Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biological product intended to treat a rare disease or condition, which is generally a disease or condition that affects fewer than 200,000 individuals in the U.S., or 200,000 or more individuals in the U.S. and for which there is no reasonable expectation that the cost of developing and making the product available in the U.S. for this type of disease or condition will be recovered from sales of the product.

Orphan drug designation must be requested before submitting an NDA or BLA. After the FDA grants orphan drug designation, the identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process.

If a product that has orphan designation subsequently receives the first FDA approval 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 to market the same drug for the same indication for seven years from the date of such approval, except in limited circumstances, such as a showing of clinical superiority to the product with orphan exclusivity by means of greater effectiveness, greater safety, provision of a major contribution to patient care, or in instances of drug supply issues. Competitors, however, may receive approval of either a different product for the same indication or the same product for a different indication but that could be used off-label in the orphan indication. Orphan drug exclusivity could also block the approval of one of our products for seven years if a competitor obtains approval before we do for the same product, as defined by the FDA, for the same indication we are seeking approval, or if our product is determined to be contained within the scope of the competitor's product for the same indication or disease. If one of our products designated as an orphan drug receives marketing approval for an indication broader than that which is designated, it may not be entitled to orphan drug exclusivity. Orphan drug status in the European Union has similar, but not identical, requirements and benefits.

Expedited development and review programs

The FDA has a fast track program that is intended to expedite or facilitate the process for reviewing new drugs and biologics that meet certain criteria. Specifically, new drugs and biologics are eligible for fast track designation if they are intended to treat a serious or life-threatening condition and preclinical or clinical data demonstrate the potential to address unmet medical needs for the condition. Fast track designation applies to both the product and the specific indication for which it is being studied. The sponsor can request that the FDA designate the product for fast track status any time before receiving NDA or BLA approval, but ideally no later than the pre-NDA or pre-BLA meeting.

Any product submitted to the FDA for marketing, including under a fast track program, may be eligible for other types of FDA programs intended to expedite development and review, such as priority review and accelerated approval. Any product is eligible for priority review if it treats a serious or life-threatening condition and, if approved, would provide a significant improvement in safety and effectiveness compared to available therapies. The FDA will attempt to direct additional resources to the evaluation of an application for a new drug or biologic designated for priority review in an effort to facilitate the review.

A product may also be eligible for accelerated approval if it treats a serious or life-threatening condition and generally provides a meaningful advantage over available therapies. In addition, it must demonstrate 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, or IMM, that is reasonably likely to predict an effect on IMM or other clinical benefit. As a condition of approval, the FDA may require that a sponsor of a drug or biologic receiving accelerated approval perform adequate and well-controlled post-marketing clinical trials. If the FDA concludes that a drug or biologic shown to be effective can be safely used only if distribution or use is restricted, it will require such post-marketing restrictions as it deems necessary to assure safe use of the product.

Additionally, a drug or biologic may be eligible for designation as a breakthrough therapy if the product is intended, alone or in combination with one or more other drugs or biologics, to treat a serious or life-threatening condition and preliminary clinical evidence indicates that the product may demonstrate substantial improvement over currently approved therapies on one or more clinically significant endpoints. The benefits of breakthrough therapy designation include the same benefits as fast track designation plus intensive guidance from the FDA to ensure an efficient drug development program.

As part of the 21st Century Cures Act, Congress amended the FDCA to facilitate an efficient development program for, and expedite review of, RMATs which include cell and gene therapies, therapeutic tissue engineering products, human cell and tissue products, and combination products using any such therapies or products. RMATs do not include those human cells, tissues, and cellular and tissue based products regulated solely under section 361 of the PHSA and 21 CFR Part 1271. This program is intended to facilitate efficient development and expedite review of RMATs, which are intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition and for which preliminary clinical evidence indicates that the drug has the potential to address unmet medical needs for such disease or condition. A drug sponsor may request that the FDA designate a drug as a RMAT concurrently with, or at any time after, submission of an IND. The FDA has 60 calendar days to determine whether the drug meets the criteria, including whether there is preliminary clinical evidence indicating that the drug has the potential to address unmet medical needs for a serious or life-threatening disease or condition. A BLA for a regenerative medicine therapy that has received RMAT designation may be eligible for priority review or accelerated approval through use of surrogate or intermediate endpoints reasonably likely to predict long-term clinical benefit, or reliance upon data obtained from a meaningful number of sites. Benefits of RMAT designation also include early interactions with the FDA to discuss any potential surrogate or intermediate endpoint to be used to support accelerated approval. A regenerative medicine therapy with RMAT designation that is granted accelerated approval and is subject to post-approval requirements may fulfill such requirements through the submission of clinical evidence from clinical studies, patient registries, or other sources of real world evidence, such as electronic health records; the collection of larger confirmatory data sets; or post-approval monitoring of all patients treated with such therapy prior to its approval.

Fast track designation, priority review, accelerated approval, breakthrough therapy designation, and RMAT designation do not change the standards for approval, but may expedite the development or approval process.

Pediatric information

Under the Pediatric Research Equity Act, or PREA, certain NDAs and BLAs and certain supplements to an NDA or BLA must contain data to assess the safety and efficacy of the drug for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA may grant deferrals for submission of pediatric data or full or partial waivers. The FDCA, as amended, requires that a sponsor who is planning to submit a marketing application for a drug that includes a new active ingredient, new indication, new dosage form, new dosing regimen, or new route of administration submit an initial Pediatric Study Plan, or PSP, within 60 days of an end-of-Phase 2 meeting or, if there is no such meeting, as early as practicable before the initiation of the Phase 3 or Phase 2/3 trial. The initial PSP must include an outline of the pediatric trial or trials that the sponsor plans to conduct, including study objectives and design, age groups, relevant endpoints and statistical approach, or a justification for not including such detailed information, and any request for a deferral of pediatric assessments or a full or partial waiver of the requirement to provide data from pediatric trials along with supporting information.

The FDA and the sponsor must reach an agreement on the PSP. A sponsor can submit amendments to an agreed-upon initial PSP at any time if changes to the pediatric plan need to be considered based on data collected from preclinical studies, early phase clinical trials, and/or other clinical development programs.

Post-marketing requirements

Following approval of a new product, the manufacturer and the approved product are subject to continuing regulation by the FDA, including, among other things, monitoring and record-keeping activities, reporting of adverse experiences, complying with promotion and advertising requirements, which include restrictions on promoting drugs for unapproved uses or patient populations, or off-label use, and limitations on industry-sponsored scientific and educational activities. Although physicians may prescribe legally available drugs for off-label uses, manufacturers may not market or promote such uses. Prescription drug promotional materials must be submitted to the FDA in conjunction with their first use. Further, if there are any modifications to the drug or biologic, including changes in indications, labeling or manufacturing processes or facilities, the applicant may be required to submit and obtain FDA approval of a new NDA/BLA or NDA/BLA supplement, which may require the development of additional data or preclinical studies and clinical trials.

The FDA may also place other conditions on approvals including the requirement for a Risk Evaluation and Mitigation Strategy, or REMS, to assure the safe use of the product. If the FDA concludes a REMS is needed, the sponsor of the NDA or BLA must submit a proposed REMS. The FDA will not approve the NDA or BLA without an approved REMS, if required. A REMS 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. Any of these limitations on approval or marketing could restrict the commercial promotion, distribution, prescription or dispensing of products. Product approvals may be withdrawn for non-compliance with regulatory standards or if problems occur following initial marketing.

FDA regulations require that products be manufactured in specific approved facilities and in accordance with cGMP regulations. We rely, and expect to continue to rely, on third parties for the production of clinical and commercial quantities of our products in accordance with cGMP regulations. These manufacturers must comply with cGMP regulations that require, among other things, quality control and quality assurance, the maintenance of records and documentation and the obligation to investigate and correct any deviations from cGMP. Manufacturers and other entities involved in the manufacture and distribution of approved drugs or biologics 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 requirements and other laws. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain cGMP compliance. The discovery of violative conditions, including failure to conform to cGMP regulations, could result in enforcement actions, and the discovery of problems with a product after approval may result in restrictions on a product, manufacturer or holder of an approved NDA or BLA, including recall.

Companion diagnostics and complementary diagnostics

We believe that the success of our product candidates may depend, in part, on the development and commercialization of either a companion diagnostic or complementary diagnostic. Companion diagnostics and complementary diagnostics can identify patients who are most likely to benefit from a particular therapeutic product; identify patients likely to be at increased risk for serious side effects as a result of treatment with a particular therapeutic product; or monitor response to treatment with a particular therapeutic product for the purpose of adjusting treatment to achieve improved safety or effectiveness. Companion diagnostics and complementary diagnostics are regulated as medical devices by the FDA and, as such, require either clearance or approval prior to commercialization. The level of risk combined with available controls to mitigate risk determines whether a companion diagnostic device requires Premarket Approval Application approval or is cleared through the 510(k) premarket notification process. For a novel therapeutic product for which a

companion diagnostic device is essential for the safe and effective use of the product, the companion diagnostic device should be developed and approved or 510(k)-cleared contemporaneously with the therapeutic. The use of the companion diagnostic device will be stipulated in the labeling of the therapeutic product. This is also true for a complementary diagnostic, although it is not a prerequisite for receiving the therapeutic.

Other regulatory matters

Manufacturing, sales, promotion and other activities following product approval are also subject to regulation by numerous regulatory authorities in the U.S. in addition to the FDA, including the Centers for Medicare & Medicaid Services, or CMS, other divisions of the Department of Health and Human Services, or HHS, the Department of Justice, the Drug Enforcement Administration, the Consumer Product Safety Commission, the Federal Trade Commission, the Occupational Safety & Health Administration, the Environmental Protection Agency and state and local governments.

Healthcare providers, physicians, and third-party payors will play a primary role in the recommendation and prescription of any products for which we obtain marketing approval. Our future arrangements with third party payors, healthcare providers and physicians may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell and distribute any drugs for which we obtain marketing approval. In the U.S., these laws include: the federal Anti-Kickback Statute, the False Claims Act, laws and regulations related to the reporting of payments to physicians and teaching hospitals, and the Health Insurance Portability and Accountability Act of 1996, or HIPAA.

The Anti-Kickback Statute makes it illegal for any person, including a prescription drug manufacturer (or a party acting on its behalf), to knowingly and willfully solicit, receive, offer, pay or provide any remuneration, directly or indirectly, in cash or in kind, that is intended to induce or reward referrals, including the purchase, recommendation, order or prescription of a particular drug, for which payment may be made under a federal healthcare program, such as Medicare or Medicaid. Violations of this law are punishable by up to five years in prison, criminal fines, administrative civil money penalties for each violation, plus up to three times the renumeration involved, and exclusion from participation in federal healthcare programs. In addition, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it.

The federal civil and criminal false claims laws, including the civil False Claims Act, and civil monetary penalty laws impose civil penalties, including through civil whistleblower or qui tam actions, against individuals or entities (including manufacturers) for, among other things, knowingly presenting or causing to be presented false or fraudulent claims for payment by a federal healthcare program or making a false statement or record material to payment of a false claim or avoiding, decreasing or concealing an obligation to pay money to the federal government. Penalties for a False Claims Act violation include three times the actual damages sustained by the government, plus mandatory civil penalties for each separate false claim, the potential for exclusion from participation in federal healthcare programs, and the potential implication of various federal criminal statutes. Manufacturers can be held liable under the federal 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. The government may deem manufacturers to have “caused” the submission of false or fraudulent claims by, for example, providing inaccurate billing or coding information to customers or promoting a product off-label. Claims which include items or services resulting from a violation of the federal Anti-Kickback Statute are false or fraudulent claims for purposes of the False Claims Act. The federal False Claims Act also permits a private individual acting as a “whistleblower” to bring actions on behalf of the federal government alleging violations of the False Claims Act and to share in any monetary recovery. Our future marketing and activities relating to the reporting of wholesaler or estimated retail prices for our products, the reporting of prices used to calculate Medicaid rebate information and other information affecting federal, state and third-party reimbursement for our products, as well as the sale and marketing of our product and any future product candidates, are subject to scrutiny under this law.

HIPAA imposes criminal and civil liability for knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or knowingly and willfully making false statements, and concealing or covering up by any trick or device a material fact or making any materially false statement relating to healthcare matters. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.

HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH, and their implementing regulations, also imposes obligations, including mandatory contractual terms and technical safeguards, with respect to maintaining the privacy, security and transmission of individually identifiable health information held by covered entities and their business associates. HITECH also created new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions.

The Physician Payments Sunshine Act of 2010, as amended by the Health Care and Education Reconciliation Act, which requires applicable manufacturers of covered drugs, biologics, and medical supplies (those paid for by a federal healthcare program) to report annually to CMS information related to any payments and other transfers of value made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. Effective January 1, 2022, these reporting obligations will extend to include transfers of value made to certain non-physician providers such as physician assistants and nurse practitioners.

Analogous state and foreign fraud and abuse laws and regulations, such as state anti-kickback and false claims laws, may apply to sales or marketing arrangements and claims involving healthcare items or services. Such laws are generally broad and are enforced by various state agencies and private actions. Some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant federal government compliance guidance and require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures. Certain state and local laws require the registration of pharmaceutical sales representatives.

State and foreign laws also govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not pre-empted by HIPAA, thus complicating compliance efforts. For example, in California, the California Consumer Protection Act, or CCPA, which went into effect on January 1, 2020, establishes a new privacy framework for covered businesses by creating an expanded definition of personal information, establishing new data privacy rights for consumers in the State of California, imposing special rules on the collection of consumer data from minors, and creating a new and potentially severe statutory damages framework for violations of the CCPA and for businesses that fail to implement reasonable security procedures and practices to prevent data breaches. While clinical trial data and information governed by HIPAA are currently exempt from the current version of the CCPA, other personal information may be applicable and possible changes to the CCPA may broaden its scope. In addition, a new California ballot initiative, the California Privacy Rights Act, or CPRA, was passed in November 2020. Effective starting on January 1, 2023, the CPRA imposes additional obligations on companies covered by the legislation and will significantly modify the CCPA, including by expanding consumers' rights with respect to certain sensitive personal information.

The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies have recently increased their scrutiny of interactions between healthcare companies and healthcare providers, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or

other healthcare laws and regulations. If our operations are found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, imprisonment, exclusion of drugs from government funded healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations. If any of the physicians or other healthcare providers or entities with whom we expect to do business is found to not be in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs. Ensuring business arrangements comply with applicable healthcare laws, as well as responding to possible investigations by government authorities, can be time- and resource-consuming and can divert a company's attention away from the business.

Current and Future Legislation

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

In March 2010, the Congress enacted the Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the ACA, which, among other things:

- created an annual, nondeductible fee on any entity that manufactures or imports specified branded prescription drugs and biologic products, apportioned among these entities according to their market share in certain government healthcare programs;
- expanded eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to certain individuals with income at or below 133% of the federal poverty level, thereby potentially increasing a manufacturer's Medicaid rebate liability;
- expanded manufacturers' rebate liability under the Medicaid Drug Rebate Program by increasing the minimum rebate for both branded and generic drugs and revising the definition of "average manufacturer price," or AMP, for calculating and reporting Medicaid drug rebates on outpatient prescription drug prices;
- addressed a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected;
- expanded the types of entities eligible for the 340B drug discount program;
- established the Medicare Part D coverage gap discount program by requiring manufacturers to provide a 50% point-of-sale-discount, which was increased to 70% by the Bipartisan Budget Act of 2018 (as of January 1, 2019), off the negotiated price of applicable brand drugs to eligible beneficiaries during their coverage gap period as a condition for the manufacturers' outpatient drugs to be covered under Medicare Part D; and
- created a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research.

With the new administration and Congress, there will likely be additional administrative or legislative changes, including modification, repeal, or replacement of all, or certain provisions of the ACA which may impact reimbursement for drugs and biologics. For example the Tax Cuts and Jobs Act of 2017, or TCJA, includes a provision that decreased, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate," to $0. On December 14, 2018, a U.S. District

Court Judge in the Northern District of Texas, ruled that the individual mandate is a critical and inseverable feature of the ACA, and therefore, because the Trump administration and CMS have both stated that the ruling will have no immediate effect, and on December 18, 2019, the Fifth Circuit U.S. Court of Appeals held the individual mandate unconstitutional, and remanded the case to the lower court to reconsider its earlier invalidation of the full ACA. On March 2, 2020, the U.S. Supreme Court granted the petitions for writs of certiorari to review this case, and held oral arguments on November 10, 2020. It is unclear what effect this will have on the status of the ACA. Congress may also consider other legislation to repeal or replace certain elements of the ACA. In addition, since January 2017, President Trump has signed two Executive Orders designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. On January 20, 2017, President Trump signed an Executive Order directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from, or delay the implementation of any provision of the ACA that would impose a fiscal burden on states or a cost, fee, tax, penalty or regulatory burden on individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. Further, on October 13, 2017, President Trump signed an Executive Order terminating the cost-sharing subsidies that reimburse insurers under the ACA. The Trump administration has concluded that cost-sharing reduction, or CSR, payments to insurance companies required under the ACA have not received necessary appropriations from Congress and announced that it would discontinue these payments immediately until such appropriations are made. Several state attorneys general filed suit to stop the Trump administration from terminating the subsidies, but their request for a restraining order was denied by a federal judge in California on October 25, 2017. On August 14, 2020, the U.S. Court of Appeals for the Federal Circuit ruled in two separate cases that the federal government is liable for the full amount of unpaid CSRs for the years preceding and including 2017. For CSR claims made by health insurance companies for years 2018 and later, further litigation will be required to determine the amounts due, if any. Further, on June 14, 2018, the U.S. Court of Appeals for the Federal Circuit ruled that the federal government was not required to pay more than $12 billion in ACA risk corridor payments to third-party payors who argued they were owed to them. On April 27, 2020, the U.S. Supreme Court reversed the U.S. Court of Appeals for the Federal Circuit decision and remanded the case to the U.S. Court of Federal Claims, concluding the government has an obligation to pay these risk corridor payments under the relevant formula. It is unclear what impact these rulings will have on our business. In addition, CMS has published a final rule that gives states greater flexibility, starting in 2020, in setting benchmarks for insurers in the individual and small group market places, which may have the effect of relaxing the essential health benefits required under the ACA for plans sold through such marketplaces. Litigation and legislation over the ACA are likely to continue, with unpredictable and uncertain results.

Packaging and Distribution in the U.S.

If our products are made available to authorized users of the Federal Supply Schedule of the General Services Administration, additional laws and requirements apply. Products must meet applicable child-resistant packaging requirements under the U.S. Poison Prevention Packaging Act. Manufacturing, sales, promotion and other activities also are potentially subject to federal and state consumer protection and unfair competition laws.

The distribution of pharmaceutical products is subject to additional requirements and regulations, including extensive record-keeping, licensing, storage and security requirements intended to prevent the unauthorized sale of pharmaceutical products.

The failure to comply with any of these laws or regulatory requirements subjects firms to possible legal or regulatory action. Depending on the circumstances, failure to meet applicable regulatory requirements can result in criminal prosecution, fines or other penalties, injunctions, exclusion from federal healthcare programs, requests for recall, seizure of products, total or partial suspension of production, denial or withdrawal of product approvals, or refusal to allow a firm to enter into supply contracts, including government contracts. Any action against us for violation of these laws, even if we successfully defend against it, could cause us to incur significant legal expenses and divert our management’s attention from the operation of our business. Prohibitions or restrictions on sales or withdrawal of future products marketed by us could materially affect our business in an adverse way.

Changes in regulations, statutes or the interpretation of existing regulations could impact our business in the future by requiring, for example: (i) changes to our manufacturing arrangements; (ii) additions or modifications to product labeling; (iii) the recall or discontinuation of our products; or (iv) additional record-keeping requirements. If any such changes were to be imposed, they could adversely affect the operation of our business.

Other U.S. environmental, health and safety laws and regulations

We may be subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. From time to time and in the future, our operations may involve the use of hazardous and flammable materials, including chemicals and biological materials, and may also produce hazardous waste products. Even if we contract with third parties for the disposal of these materials and waste products, we cannot completely eliminate the risk of contamination or injury resulting from these materials. In the event of contamination or injury resulting from the use or disposal of our hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties for failure to comply with such laws and regulations.

We maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees, but this insurance may not provide adequate coverage against potential liabilities. However, we do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us.

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

U.S. patent term restoration and marketing exclusivity

Depending upon the timing, duration and specifics of FDA approval of MGTA-145 and any other current or future product candidates, some of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit restoration of the patent term of up to five years as compensation for patent term lost during product development and FDA regulatory review process. Patent-term restoration, however, cannot extend the remaining term of a patent beyond a total of 14 years from the product's approval date. The patent-term restoration period is generally one-half the time between the effective date of an IND and the submission date of an NDA or BLA plus the time between the submission date of an NDA or BLA and the approval of that application, except that the review period is reduced by any time during which the applicant failed to exercise due diligence. Only one patent applicable to an approved drug is eligible for the extension and the application for the extension must be submitted prior to the expiration of the patent. The U.S. Patent and Trademark Office, in consultation with the FDA, reviews and approves the application for any patent term extension or restoration. In the future, we may apply for restoration of patent term for our currently owned or licensed patents to add patent life beyond its current expiration date, depending on the expected length of the clinical trials and other factors involved in the filing of the relevant NDA or BLA.

Market exclusivity provisions under the FDCA also can delay the submission or the approval of certain applications. The FDCA provides a five-year period of non-patent marketing exclusivity within the U.S. to the first applicant to gain approval of an NDA for a new chemical entity. A drug is a new chemical entity if the FDA has not previously approved any other new drug containing the same active moiety, which is the molecule or ion responsible for the action of the drug substance. During the exclusivity period, the FDA may not accept for review an abbreviated new drug application, or ANDA, or a 505(b)(2) NDA submitted by another company for another version of such drug where the applicant does not own or have a legal right of reference to all the data

required for approval. However, an application may be submitted after four years if it contains a certification of patent invalidity or non-infringement. The FDCA also provides three years of marketing exclusivity for an NDA, 505(b)(2) NDA or supplement to an existing NDA if new clinical investigations, other than bioavailability studies, that were conducted or sponsored by the applicant are deemed by the FDA to be essential to the approval of the application, for example, new indications, dosages or strengths of an existing drug. This three-year exclusivity covers only the conditions of use associated with the new clinical investigations and does not prohibit the FDA from approving ANDAs for drugs containing the original active agent. Five-year and three-year exclusivity will not delay the submission or approval of a full NDA. However, an applicant submitting a full NDA would be required to conduct or obtain a right of reference to all of the preclinical studies and adequate and well-controlled clinical trials necessary to demonstrate safety and effectiveness.

An abbreviated approval pathway for biological products shown to be similar to, or interchangeable with, an FDA-licensed reference biological product was created by the Biologics Price Competition and Innovation Act of 2009 as part of the ACA. This amendment to the PHSA, in part, attempts to minimize duplicative testing. Biosimilarity, which requires that the biological product be highly similar to the reference product notwithstanding minor differences in clinically inactive components and that there be no clinically meaningful differences between the product and the reference product in terms of safety, purity and potency, can be shown through analytical studies, animal studies and a clinical trial or trials. Interchangeability requires that a biological product be biosimilar to the reference product and that the product can be expected to produce the same clinical results as the reference product in any given patient and, for products administered multiple times to an individual, that the product and the reference product 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 biological product without such alternation or switch. Complexities associated with the larger, and often more complex, structure of biological products as compared to small molecule drugs, as well as the processes by which such products are manufactured, pose significant hurdles to implementation that are still being worked out by the FDA.

A reference biological product is granted four- and twelve-year exclusivity periods from the time of first licensure of the product. The FDA will not accept an application for a biosimilar or interchangeable product based on the reference biological product until four years after the date of first licensure of the reference product, and the FDA will not approve an application for a biosimilar or interchangeable product based on the reference biological product until twelve years after the date of first licensure of the reference product. “First licensure” typically means the initial date the particular product at issue was licensed in the U.S. Date of first licensure does not include the date of licensure of (and a new period of exclusivity is not available for) a biological product if the licensure is for a supplement for the biological product or for a subsequent application by the same sponsor or manufacturer of the biological product (or licensor, predecessor in interest, or other related entity) for a change (not including a modification to the structure of the biological product) that results in a new indication, route of administration, dosing schedule, dosage form, delivery system, delivery device or strength, or for a modification to the structure of the biological product that does not result in a change in safety, purity, or potency. Therefore, one must determine whether a new product includes a modification to the structure of a previously licensed product that results in a change in safety, purity, or potency to assess whether the licensure of the new product is a first licensure that triggers its own period of exclusivity. Whether a subsequent application, if approved, warrants exclusivity as the “first licensure” of a biological product is determined on a case-by-case basis with data submitted by the sponsor.

Pediatric exclusivity is another type of regulatory market exclusivity in the U.S. Pediatric exclusivity, if granted, adds six months to existing regulatory exclusivity periods. This six-month exclusivity may be granted based on the voluntary completion of a pediatric trial in accordance with an FDA-issued “Written Request” for such a trial.

European Union drug development

In the European Union, our future products also may be subject to extensive regulatory requirements. As in the U.S., medicinal products can be marketed only if a marketing authorization from the competent regulatory agencies has been obtained.

Similar to the U.S., the various phases of preclinical and clinical research in the European Union are subject to significant regulatory controls. Although the European Union Clinical Trials Directive 2001/20/EC, or Directive, has sought to harmonize the European Union clinical trials regulatory framework, setting out common rules for the control and authorization of clinical trials in the European Union, the European Union Member States have transposed and applied the provisions of the Directive differently. This has led to significant variations in the member state regimes. Under the current regime, before a clinical trial can be initiated it must be approved in each of the European Union countries where the trial is to be conducted by two distinct bodies: the National Competent Authority, or NCA, and one or more Ethics Committees, or ECs. Under the current regime all suspected unexpected serious adverse reactions to the investigated drug that occur during the clinical trial have to be reported to the NCA and ECs of the European Union Member State where they occurred.

In April 2014, the European Union adopted a new Clinical Trials Regulation (EU) No 536/2014, which is set to replace the current Clinical Trials Directive 2001/20/EC. It will overhaul the current system of approvals for clinical trials in the European Union, and is aimed at harmonizing and streamlining clinical-trial authorization (for example, by providing for a streamlined application procedure via a single entry point and strictly defined deadlines for the assessment of clinical trial applications), simplifying adverse-event reporting procedures, improving the supervision of clinical trials and increasing their transparency. The new Clinical Trials Regulation ensures that the rules for conducting clinical trials in the European Union will be identical, as no national implementing legislation in each European Union Member State will be required. It is expected that the new Clinical Trials Regulation will come into effect following confirmation of full functionality of the Clinical Trials Information System, the centralized European Union portal and database for clinical trials foreseen by the new Clinical Trials Regulation, through an independent audit, which is currently anticipated to occur in December 2021.

European Union drug marketing

Much like the Anti-Kickback Statue prohibition in the U.S., the provision of benefits or advantages to physicians to induce or encourage the prescription, recommendation, endorsement, purchase, supply, order or use of medicinal products is also prohibited in the European Union and the U.K. The provision of benefits or advantages to induce or reward improper performance generally is governed by the national anti-bribery laws of European Union Member States, and the Bribery Act 2010 in the U.K. Infringement of these laws could result in substantial fines and imprisonment. European Union Directive 2001/83/EC, which is the European Union Directive governing medicinal products for human use, further provides that, where medicinal products are being promoted to persons qualified to prescribe or supply them, no gifts, pecuniary advantages or benefits in kind may be supplied, offered or promised to such persons unless they are inexpensive and relevant to the practice of medicine or pharmacy. This provision has been transposed into the Human Medicines Regulations 2012 and so remains applicable in the U.K. despite its departure from the European Union.

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

European Union drug review and approval

In the European Economic Area, or EEA, which is comprised of the Member States of the European Union (plus Norway, Iceland and Liechtenstein), medicinal products can only be commercialized after obtaining a Marketing Authorization, or MA. There are two types of marketing authorizations.

- The Centralized MA is issued by the European Commission through the Centralized Procedure, based on the opinion of the Committee for Medicinal Products for Human Use, or CHMP, of the EMA and is valid throughout the entire territory of the EEA. The Centralized Procedure is mandatory for certain types of products, such as biotechnology medicinal products, orphan medicinal products, advanced-therapy medicines (gene-therapy, somatic cell-therapy or tissue-engineered medicines) and medicinal products containing a new active substance indicated for the treatment of HIV, AIDS, cancer, neurodegenerative disorders, diabetes, auto-immune and other immune dysfunctions and viral diseases. The Centralized Procedure is optional for products containing a new active substance not yet authorized in the EEA, or for products that constitute a significant therapeutic, scientific or technical innovation or which are in the interest of public health in the European Union. Under the Centralized Procedure the maximum timeframe for the evaluation of a Marketing Authorization Application, or MAA, by the EMA is 210 days, excluding clock stops, when additional written or oral information is to be provided by the applicant in response to questions asked by the CHMP. Clock stops may extend the timeframe of evaluation of a MAA considerably beyond 210 days. Where the CHMP gives a positive opinion, it provides the opinion together with supporting documentation to the European Commission, who make the final decision to grant a marketing authorization, which is issued within 67 days of receipt of the EMA's recommendation. Accelerated assessment might be granted by the CHMP in exceptional cases, when a medicinal product is expected to be of major public health interest, particularly from the point of view of therapeutic innovation. The timeframe for the evaluation of a MAA under the accelerated assessment procedure is 150 days, excluding clock stops, but it is possible that the CHMP may revert to the standard time limit for the centralized procedure if it determines that the application is no longer appropriate to conduct an accelerated assessment.
- National MAs, which are issued by the competent authorities of the Member States of the EEA and only cover their respective territory, are available for products not falling within the mandatory scope of the Centralized Procedure. Where a product has already been authorized for marketing in a Member State of the EEA, this National MA can be recognized in other Member States of the EEA through the Mutual Recognition Procedure. If the product has not received a National MA in any Member State of the EEA at the time of application, it can be approved simultaneously in various Member States of the EEA through the Decentralized Procedure. Under the Decentralized Procedure an identical dossier is submitted to the competent authorities of each of the Member States of the EEA in which a MA is sought, one of which is selected by the applicant as the Reference Member State, or RMS. The competent authority of the RMS prepares a draft assessment report, a draft summary of the product characteristics, or SmPC, and a draft of the labeling and package leaflet, which are sent to the other Member States of the EEA (referred to as the Concerned Member States) for their approval. If the Concerned Member States raise no objections, based on a potential serious risk to public health, to the assessment, SmPC, labeling, or packaging proposed by the RMS, the product is subsequently granted a National MA in all the Member States (i.e., in the RMS and the Concerned Member States).

Under the above described procedures, before granting a MA, the EMA or the competent authorities of the Member States of the EEA make an assessment of the risk-benefit balance of the product on the basis of scientific criteria concerning its quality, safety and efficacy.

Now that the U.K. (which comprises Great Britain and Northern Ireland) has left the European Union, Great Britain will no longer be covered by Centralized MAs (under the Northern Irish Protocol, Centralized MAs will continue to be recognized in Northern Ireland). All medicinal products with a current Centralized MA were automatically converted to Great Britain MAs on January 1, 2021. For a period of two years from January 1,

2021, the Medicines and Healthcare products Regulatory Agency, or MHRA, the U.K. medicines regulator, may rely on a decision taken by the European Commission on the approval of a new MA in the Centralized Procedure, in order to more quickly grant a new Great Britain MA. A separate application will, however, still be required. The MHRA also has the power to have regard to MAs approved in the Member States of the EEA through Decentralized or Mutual Recognition Procedures with a view to more quickly granting a MA in the U.K. or Great Britain.

European Union market and data exclusivity

In the EEA, innovative medicinal products qualify for eight years of data exclusivity upon marketing authorization and an additional two years of market exclusivity. The data exclusivity, if granted, prevents generic or biosimilar applicants from referencing the innovator's pre-clinical and clinical trial data contained in the dossier of the reference product when applying for a generic or biosimilar marketing authorization in the EAA. During the additional two-year period of market exclusivity, a generic or biosimilar marketing authorization application can be submitted, and the innovator's data may be referenced, but no generic or biosimilar product can be marketed until the expiration of the market exclusivity. The overall ten-year period will be extended to a maximum of 11 years if, during the first eight years of those ten years, the marketing authorization holder obtains an authorization for one or more new therapeutic indications which, during the scientific evaluation prior to their authorization, are determined to bring a significant clinical benefit in comparison with currently approved therapies. Even if a compound is considered to be a new chemical entity so that the innovator gains the prescribed period of data exclusivity, another company may market another version of the product if such company obtained marketing authorization based on an marketing authorization application with a complete independent data package of pharmaceutical tests, preclinical tests and clinical trials.

European Union orphan designation and exclusivity

In the EEA, the EMA's Committee for Orphan Medicinal Products grants orphan drug designation to promote the development of products that are intended for the diagnosis, prevention or treatment of life-threatening or chronically debilitating conditions and either (i) such condition affects not more than 5 in 10,000 persons in the EEA or (ii) it is unlikely that the development of the medicine would generate sufficient return to justify the necessary investment in its development. In either case, the applicant must also demonstrate that no satisfactory method of diagnosis, prevention or treatment for the condition has been authorized (or, if a method exists, the product would be a significant benefit to those affected compared to the product available).

In the European Union, orphan drug designation entitles a party to financial incentives such as reduction of fees or fee waivers and ten years of market exclusivity is granted following medicinal product approval. During this market exclusivity period, neither the EMA nor the European Commission nor any of the competent authorities in the EEA Members States can accept an application or grant a marketing authorization for a "similar medicinal product." A "similar medicinal product" is defined as a medicinal product containing a similar active substance or substances as contained in an authorized orphan medicinal product, and which is intended for the same therapeutic indication. This period may be reduced to six years if the orphan drug designation criteria are no longer met, including where it is shown that the product is sufficiently profitable not to justify maintenance of market exclusivity. Market exclusivity may also be revoked in very select cases, such as if (i) it is established that a similar medicinal product is safer, more effective or otherwise clinically superior; (ii) the marketing authorization holder consents to such revocation; or (iii) the marketing authorization holder cannot supply enough orphan medicinal product. Orphan drug designation must be requested before submitting an application for marketing approval. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process.

From January 1, 2021, a separate process for orphan drug designation will apply in Great Britain. There will be no pre-marketing authorization orphan designation (as there is in the EEA) and the application for orphan designation will be reviewed by the MHRA, at the time of the marketing authorization application. The criteria

are the same as in the EEA, save that they apply to Great Britain only (e.g., there must be no satisfactory method of diagnosis, prevention or treatment of the condition concerned in Great Britain).

Brexit and the Regulatory Framework in the U.K.

On June 23, 2016, the electorate in the U.K. voted in favor of leaving the European Union (commonly referred to as Brexit). Thereafter, on March 29, 2017, the country formally notified the European Union of its intention to withdraw pursuant to Article 50 of the Lisbon Treaty. The U.K. formally left the European Union on January 31, 2020. A transition period began on February 1, 2020, during which European Union pharmaceutical law remained applicable to the U.K. and ended on December 31, 2020. Since the regulatory framework for pharmaceutical products in the U.K. covering quality, safety, and efficacy of pharmaceutical products, clinical trials, marketing authorization, commercial sales, and distribution of pharmaceutical products is derived from European Union directives and regulations, Brexit could materially impact the future regulatory regime which applies to products and the approval of product candidates in the U.K., as the U.K. legislation now has the potential to diverge from European Union legislation. It remains to be seen how Brexit will impact regulatory requirements for medicinal products and devices in the U.K. in the long-term. The MHRA has recently published detailed guidance for industry and organizations to follow now the transition period is over, which will be updated as the U.K.'s regulatory position on medicinal products and medical devices evolves over time.

European and United Kingdom Data Collection

The collection and use of personal health data in the European Union is governed, as of May 2018, by the General Data Protection Regulation, or GDPR. The GDPR imposes several requirements on companies that process personal data, including requirements relating to the processing of health and other sensitive data, the consent of the individuals to whom the personal data relates, the information provided to the individuals regarding data processing activities, the notification of data processing obligations to the competent national data protection authorities and certain measures to be taken when engaging third-party processors. The GDPR also imposes strict rules on the transfer of personal data out of the European Economic Area, including to the U.S. Failure to comply with the requirements of the GDPR, and the related national data protection laws of the European Union Member States, may result in fines and other administrative penalties, including potential fines of up to €20 million or 4% of annual global revenues, whichever is greater. The GDPR also confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies, and obtain compensation for damages resulting from violations of the GDPR. The GDPR regulations may impose additional responsibility and liability in relation to personal data that we process, and we may be required to put in place additional mechanisms ensuring compliance with the new data protection rules, including as implemented by individual countries. This may be onerous and adversely affect our business, financial condition, results of operations and prospects. In addition, further to the U.K.'s exit from the European Union on January 31, 2020, the GDPR ceased to apply in the U.K. at the end of the transition period on December 31, 2020. However, as of January 1, 2021, the U.K.'s European Union (Withdrawal) Act 2018 incorporated the GDPR (as it existed on December 31, 2020 but subject to certain U.K. specific amendments) into U.K. law (referred to as the U.K. GDPR). The U.K. GDPR and the U.K. Data Protection Act 2018 set out the U.K.'s data protection regime, which is independent from but aligned to the European Union's data protection regime. Non-compliance with the U.K. GDPR may result in monetary penalties of up to £17.5 million or 4% of worldwide revenue, whichever is higher. The U.K., however, is now regarded as a third country under the European Union's GDPR which means that transfers of personal data from the EEA to the U.K. will be restricted unless an appropriate safeguard, as recognized by the European Union's GDPR, has been put in place. Although, under the EU-U.K. Trade Cooperation Agreement it is lawful to transfer personal data between the U.K. and the EEA for a 6 month period following the end of the transition period, with a view to achieving an adequacy decision from the European Commission during that period. Like the European Union GDPR, the U.K. GDPR restricts personal data transfers outside the U.K. to countries not regarded by the U.K. as providing adequate protection (this means that personal data transfers from the U.K. to the EEA remain free flowing). Compliance with the GDPR and the U.K. GDPR is a rigorous and time-intensive process that may increase our cost of doing business or require us to change our business practices, and

despite those efforts, there is a risk that we may be subject to fines and penalties, litigation, and reputational harm in connection with any future European or U.K. activities.

Rest of the world regulation

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

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

Additional laws and regulations governing international operations

If we further expand our operations outside of the U.S., we must dedicate additional resources to comply with numerous laws and regulations in each jurisdiction in which we plan to operate. The Foreign Corrupt Practices Act, or FCPA, prohibits any U.S. individual or business from paying, offering, authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the U.S. to comply with certain accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations.

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

Various laws, regulations and executive orders also restrict the use and dissemination outside of the U.S., or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. If we expand our presence outside of the U.S., it will require us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing, manufacturing, or selling certain products and product candidates outside of the U.S., which could limit our growth potential and increase our development costs.

The failure to comply with laws governing international business practices may result in substantial civil and criminal penalties and suspension or debarment from government contracting. The SEC also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions.

Reimbursement

Sales of our products will depend, in part, on the extent to which our products will be covered by third-party payors, such as government health programs, commercial insurance and managed healthcare organizations. In the U.S., no uniform policy of coverage and reimbursement for drug or biological products exists. Accordingly, decisions regarding the extent of coverage and amount of reimbursement to be provided for any of our products will be made on a payor-by-payor basis. The process for determining whether a third-party payor will provide coverage for a product may be separate from the process for setting the price or reimbursement rate that the

payor will pay for the product once coverage is approved. Third-party payors are increasingly challenging the prices charged, examining the medical necessity, and reviewing the cost-effectiveness of medical products and services and imposing controls to manage costs. Third-party payors may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the approved products for a particular indication. As a result, the coverage determination process is often a time-consuming and costly process that will require us to provide scientific and clinical support for the use of our products to each payor separately, with no assurance that coverage and adequate reimbursement will be obtained.

The U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost containment programs to limit the growth of government-paid health care costs, including price-controls, restrictions on reimbursement and requirements for substitution of generic products for branded prescription drugs. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit a company's revenue generated from the sale of any approved products. For example, the ACA contains provisions that subject biological products to potential competition by lower-cost biosimilars and may reduce the profitability of drug products through increased rebates for drugs reimbursed by Medicaid programs, extension of Medicaid rebates to Medicaid managed care plans, mandatory discounts for certain Medicare Part D beneficiaries and annual fees based on pharmaceutical companies' share of sales to federal health care programs. Adoption of general controls and measures, coupled with the tightening of restrictive policies in jurisdictions with existing controls and measures, could limit payments for pharmaceutical drugs.

The Medicaid Drug Rebate Program requires pharmaceutical manufacturers to enter into and have in effect a national rebate agreement with the Secretary of the Department of Health and Human Services as a condition for states to receive federal matching funds for the manufacturer's outpatient drugs furnished to Medicaid patients. The ACA made several changes to the Medicaid Drug Rebate Program, including increasing pharmaceutical manufacturers' rebate liability by raising the minimum basic Medicaid rebate on most branded prescription drugs of AMP and adding a new rebate calculation for "line extensions" (i.e., new formulations, such as extended release formulations) of solid oral dosage forms of branded products, creating a new methodology by which rebates owed are calculated for drugs that are inhaled, infused, instilled, implanted or injected, as well as potentially impacting their rebate liability by modifying the statutory definition of AMP. The ACA also expanded the universe of Medicaid utilization subject to drug rebates by requiring pharmaceutical manufacturers to pay rebates on Medicaid managed care utilization and by enlarging the population potentially eligible for Medicaid drug benefits. Pricing and rebate programs must also comply with the Medicaid rebate requirements of the U.S. Omnibus Budget Reconciliation Act of 1990.

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003, or the MMA, established the Medicare Part D program to provide a voluntary prescription drug benefit to Medicare beneficiaries. Under Part D, Medicare beneficiaries may enroll in prescription drug plans offered by private entities that provide coverage of outpatient prescription drugs. Unlike Medicare Part A and B, Part D coverage is not standardized. While all Medicare drug plans must give at least a standard level of coverage set by Medicare, Part D prescription drug plan sponsors are not required to pay for all covered Part D drugs, and each drug plan can develop its own drug formulary that identifies which drugs it will cover and at what tier or level. However, Part D prescription drug formularies must include drugs within each therapeutic category and class of covered Part D drugs, though not necessarily all the drugs in each category or class. Any formulary used by a Part D prescription drug plan must be developed and reviewed by a pharmacy and therapeutic committee. Government payment for some of the costs of prescription drugs may increase demand for products for which we receive marketing approval. However, any negotiated prices for our products covered by a Part D prescription drug plan likely will be lower than the prices we might otherwise obtain. Moreover, while the MMA applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own payment rates. Any reduction in payment that results from the MMA may result in a similar reduction in payments from non-governmental payors.

For a drug product to receive federal reimbursement under the Medicaid or Medicare Part B programs or to be sold directly to U.S. government agencies, the manufacturer must extend discounts to entities eligible to participate in the 340B drug pricing program. The required 340B discount on a given product is calculated based on the AMP and Medicaid rebate amounts reported by the manufacturer. As of 2010, the ACA expanded the types of entities eligible to receive discounted 340B pricing, although, under the current state of the law, with the exception of children's hospitals, these newly eligible entities will not be eligible to receive discounted 340B pricing on orphan drugs. In addition, as 340B drug pricing is determined based on AMP and Medicaid rebate data, the revisions to the Medicaid rebate formula and AMP definition described above could cause the required 340B discount to increase.

As noted above, the marketability of any products for which we receive regulatory approval for commercial sale may suffer if the government and third-party payors fail to provide adequate coverage and reimbursement. An increasing emphasis on cost containment measures in the U.S. has increased and we expect will continue to increase the pressure on pharmaceutical pricing. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

In recent years, additional laws have resulted in direct or indirect reimbursement reductions for certain Medicare providers.

- The Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. These changes included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, which went into effect in April 2013 and will remain in effect through 2030 unless additional Congressional action is taken. However, pursuant to the Coronavirus Aid, Relief and Economic Security Act, or CARES Act, and subsequent legislation, these Medicare sequester reductions are suspended from May 1, 2020 through March 31, 2020 due to the COVID-19 pandemic.
- The American Taxpayer Relief Act of 2012, among other things, reduced Medicare payments to several providers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.
- The Middle Class Tax Relief and Job Creation Act of 2012 required that the Centers for Medicare & Medicaid Services reduce the Medicare clinical laboratory fee schedule by 2% in 2013, which served as a base for 2014 and subsequent years. In addition, effective January 1, 2014, CMS also began bundling the Medicare payments for certain laboratory tests ordered while a patient received services in a hospital outpatient setting.

In addition, the Trump administration's budget proposal for fiscal year 2021 includes a $135 billion allowance to support legislative proposals seeking to reduce drug prices, increase competition, lower out-of-pocket drug costs for patients, and increase patient access to lower-cost generic and biosimilar drugs. On March 10, 2020, the Trump administration sent "principles" for drug pricing to Congress, calling for legislation that would, among other things, cap Medicare Part D beneficiary out-of-pocket pharmacy expenses, provide an option to cap Medicare Part D beneficiary monthly out-of-pocket expenses, and place limits on pharmaceutical price increases. Additionally, the Trump administration previously released a "Blueprint" to reduce the cost of drugs. HHS has solicited feedback on some measures and has implemented others under its existing authority. For example, in May 2019, CMS issued a final rule that would allow Medicare Advantage Plans the option of using step therapy, a type of prior authorization, for Part B drugs beginning January 1, 2020. This final rule codified CMS's policy change that was effective January 1, 2019.

At the state level, legislatures have become increasingly aggressive in passing legislation and implementing regulations designed to control pharmaceutical and biological product pricing. Some of these measures include price or patient reimbursement constraints, discounts, restrictions on certain product access, marketing cost disclosure and transparency measures, and, in some cases, measures designed to encourage importation from other countries and bulk purchasing. In addition, regional health care authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and which suppliers will be included in their prescription drug and other health care programs.

These laws, and future state and federal healthcare reform measures may be adopted in the future, any of which may result in additional reductions in Medicare and other healthcare funding and otherwise affect the prices we may obtain for any of our product candidates for which we may obtain regulatory approval or the frequency with which any such product candidate is prescribed or used.

In addition, in most foreign countries, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing and reimbursement vary widely from country to country. For example, the European Union provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. Reference pricing used by various European Union member states and parallel distribution, or arbitrage between low-priced and high-priced member states, can further reduce prices. A member state may approve a specific price for the medicinal product, or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. In some countries, we may be required to conduct a clinical trial or other trials that compare the cost-effectiveness of any of our product candidates to other available therapies in order to obtain or maintain reimbursement or pricing approval. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products. Historically, products launched in the European Union do not follow price structures of the U.S. and generally prices tend to be significantly lower. Publication of discounts by third-party payors or authorities may lead to further pressure on the prices or reimbursement levels within the country of publication and other countries. If pricing is set at unsatisfactory levels or if reimbursement of our products is unavailable or limited in scope or amount, our revenues from sales by us or our strategic partners and the potential profitability of any of our product candidates in those countries would be negatively affected.

Employees and Human Capital

As of December 31, 2020, we had 69 full-time employees, 28 of our employees have Ph.D. or M.D. degrees and 45 of our employees are engaged in research and development activities.

Our human capital resource objectives include, as applicable, identifying, recruiting, retaining, incentivizing and integrating our employees with the common purpose of helping more patients live free from disease. At Magenta, we celebrate our differences and value the power of a diverse array of people who bring all of themselves to their work. We embrace cultural, racial, gender, cognitive, social and professional diversity because we know that the only way we are going to make new cures possible is by working together. We prioritize employee development and seek to align employees' goals with Magenta's overall strategic direction. We use our equity incentive plan to attract, retain and motivate selected employees, consultants and directors through the granting of stock-based compensation awards to achieve short- and long-term results that are in the best interests of investors, Magenta's mission and our patients. For additional information on the impact of COVID-19 on our employees, see "Management's Discussion and Analysis of Financial Condition and Results of Operations—Impact of the COVID-19 Pandemic".

Our Corporate Information

We were incorporated under the laws of the State of Delaware on June 17, 2015 under the name HSCTCo Therapeutics, Inc. In February 2016, we changed our name to Magenta Therapeutics, Inc.

On June 25, 2018, we completed the initial public offering, or IPO, pursuant to which we issued and sold 6,666,667 shares of common stock at a public offering price of $15.00 per share, resulting in net proceeds of $89.9 million, after deducting underwriting discounts and commissions and other offering expenses. Upon the closing of the IPO, our outstanding redeemable convertible preferred stock automatically converted into shares of common stock.

See Part II—Item 7—Management's Discussion and Analysis of Financial Condition and Results of Operations and Note 1 to the consolidated financial statements included in Part II—Item 8 for more information about the above-mentioned transactions.

We are an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012. We will remain an emerging growth company until the earlier of: (i) the last day of the fiscal year (a) following the fifth anniversary of the completion of the IPO, (b) in which we have total annual gross revenue of at least $1.07 billion, or (c) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds $700.0 million as of the prior June 30th, and (ii) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period.

We are also a "smaller reporting company" as defined in the Securities and Exchange Act of 1934, as amended, or the Exchange Act. We may continue to be a smaller reporting company even after we are no longer an emerging growth company. We may take advantage of certain of the scaled disclosures available to smaller reporting companies until the fiscal year following the determination that our voting and non-voting common stock held by non-affiliates is more than $250 million measured on the last business day of our second fiscal quarter, or our annual revenues are more than $100 million during the most recently completed fiscal year and our voting and non-voting common stock held by non-affiliates is more than $700 million measured on the last business day of our second fiscal quarter.

Our principal executive offices are located at 100 Technology Square, Cambridge, MA 02139, and our telephone number is (857) 242-0170. Our website address is *www.magentatx.com*. Our website and the information contained on, or that can be accessed through, the website will not be deemed to be incorporated by reference in, and are not considered part of, this Annual Report on Form 10-K.

Available Information

Our Internet address is *www.magentatx.com*. Our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, including exhibits, proxy and information statements and amendments to those reports filed or furnished pursuant to Sections 13(a) and 15(d) of the Exchange Act are available through the "Investors" portion of our website free of charge as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. Information on our website is not part of this Annual Report on Form 10-K or any of our other securities filings unless specifically incorporated herein by reference. In addition, our filings with the SEC may be accessed through the SEC's Electronic Data Gathering, Analysis and Retrieval system at *http://www.sec.gov*. All statements made in any of our securities filings, including all forward-looking statements or information, are made as of the date of the document in which the statement is included, and we do not assume or undertake any obligation to update any of those statements or documents unless we are required to do so by law.

ITEM 1A. RISK FACTORS

Set forth below are the risks that we believe are material to our investors and they should be carefully considered. If any of the following risks and uncertainties actually occurs, our business, prospects, financial condition and results of operations could be materially and adversely affected. The risks described below are not intended to be exhaustive and other factors not presently known to us or that we currently believe are immaterial may affect our business, prospects, financial condition and results of operations if they occur. This section contains forward-looking statements. You should refer to the explanation of the qualifications and limitations on forward-looking statements beginning on page three.

Risks Related to the Current Novel Coronavirus (COVID-19) Pandemic on the Company

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

Widespread outbreak of illness or other communicable diseases, health epidemics, or any other public health crisis could adversely affect our ongoing or planned research and development activities. For example, in December 2019, an outbreak of a novel strain of coronavirus originated in Wuhan, China, and has since spread to a number of other countries, including the U.S. To date, the COVID-19 pandemic has caused widespread disruptions to the U.S. and global economy and has contributed to significant volatility and negative pressure in financial markets. The global impact of the outbreak is continually evolving and, as additional cases of the virus are identified, many countries, including the U.S., have reacted by instituting quarantines, restrictions on travel and mandatory closures of businesses. Certain states and cities, including where we or the third parties with whom we engage operate, have also reacted by instituting quarantines, restrictions on travel, “stay at home” rules, restrictions on types of business that may continue to operate and restrictions on the types of construction projects that may continue.

The extent to which the COVID-19 pandemic impacts our business, financial condition and results of operations will depend on future developments, which are highly uncertain and cannot be predicted with confidence, including the scope, severity and duration of such pandemic, the actions taken to contain the pandemic or mitigate its impact, including the adoption of available COVID-19 vaccines, as well as the effect of any relaxation of current restrictions within the Cambridge community or regions in which our partners and clinical sites are located, and the direct and indirect economic effects of the pandemic and containment measures, among others. The rapid development and fluidity of this situation precludes any prediction as to the full adverse impact of the COVID-19 pandemic. Nevertheless, the COVID-19 pandemic has affected, and may continue to adversely affect, our business, financial condition and results of operations, and it has had, and may continue to have, the effect of heightening many of the risks described in this Annual Report on Form 10-K, including but not limited to, the following:

- The COVID-19 pandemic has had, and will likely continue to have, an adverse impact on various aspects of our ongoing clinical trials, including our investigator-initiated trial, and on pre-clinical studies and clinical trials, including investigator-initiated trials. For example, we staggered the initiation of our Phase 2 trials for MGTA-145 over the course of 2020 and 2021 due to the clinical trial impacts from COVID-19.
- Other potential impacts of the COVID-19 pandemic on our various clinical trials include impacts on patient dosing and study monitoring, which may be paused or delayed due to changes in policies at various clinical sites; federal, state, local or foreign laws, rules and regulations, including quarantines or other travel restrictions; the prioritization of healthcare resources toward pandemic efforts, including diminished attention from physicians serving as our clinical trial investigators and reduced availability of site staff supporting the conduct of our clinical trials; and interruption or delays in the operations of

the Food and Drug Administration, or FDA, among other reasons related to the COVID-19 pandemic. If the COVID-19 pandemic continues, other aspects of our clinical trials will likely be adversely affected, delayed or interrupted, including, for example, site initiation, patient recruitment and enrollment, availability of clinical trial materials and data analysis. Some patients and clinical investigators may not be able to comply with clinical trial protocols and patients may choose to withdraw from our studies or we may choose to, or be required to, pause enrollment and or patient dosing in our ongoing clinical trials in order to preserve health resources and protect trial participants. It is unknown how long these pauses or disruptions could continue.

- We currently rely on third parties, including our contract research organizations, or CROs, and our contract manufacturing organizations, or CMOs, and other contractors and consultants to, among other things, conduct our preclinical and clinical trials, manufacture raw materials, manufacture and supply our product candidates, ship investigational drugs and clinical trial samples, perform quality testing and supply other goods and services to run our business. If any such third party is adversely impacted by restrictions resulting from the COVID-19 pandemic, including staffing shortages, production slowdowns and disruptions in delivery systems, our supply chain may be disrupted, which could limit our ability to manufacture our product candidates for our clinical trials and conduct our research and development operations.
- We have established a work-from-home policy for all employees, other than those who are performing or supporting business-critical research and development operations or other essential activities that must be completed on-site and limited the number of staff in any given research and development laboratory. Our increased reliance on personnel working from home may negatively impact productivity, or disrupt, delay, or otherwise adversely impact our business. In addition, this could increase our cyber security risk, create data accessibility concerns and make us more susceptible to communication disruptions, any of which could adversely impact our business operations or delay necessary interactions with local and federal regulators, ethics committees, manufacturing sites, research or clinical trial sites and other important agencies and contractors.
- Our employees and contractors conducting non-business critical research and development activities have not been able to, and may not in the future be able to, access our laboratory for an extended period of time as a result of the current work-from-home policy and the possibility that governmental authorities further modify current restrictions. This could delay timely completion of preclinical activities, including completing Investigational New Drug, or IND, enabling studies or our ability to select future development candidates, and initiation of additional clinical trials for our other product candidates.
- Certain government agencies, such as health regulatory agencies and patent offices, within the U.S. or internationally have experienced, and may continue to experience, disruptions in their operations as a result of the COVID-19 pandemic. The FDA and comparable foreign regulatory agencies may have slower response times or be under-resourced to continue to monitor our clinical trials and, as a result, review, inspection and other timelines may be materially delayed. It is unknown how long these disruptions could continue. Any elongation or de-prioritization of our clinical trials or delay in regulatory review resulting from such disruptions could materially affect the development and study of our product candidates. For example, regulatory authorities may require that we not distribute a product candidate lot until the relevant agency authorizes its release. Such release authorization may be delayed as a result of the COVID-19 pandemic, which would likely result in delays to our ongoing clinical trials.
- The trading prices for our common stock and those of other biopharmaceutical companies have been highly volatile as a result of the COVID-19 pandemic. As a result, we may face difficulties raising capital through sales of our common stock or such sales may be on unfavorable terms. In addition, a recession, depression or other sustained adverse market event resulting from the COVID-19 pandemic could materially and adversely affect our business and the value of our common stock.

Risks Related to Our Financial Position and Need for Additional Capital

We have incurred net losses in every year since our inception and anticipate that we will continue to incur net losses in the future.

We are a clinical-stage biotechnology company developing novel medicines to bring the curative power of stem cell transplant to more patients and have a limited operating history. Investment in biopharmaceutical product development is highly speculative because it entails substantial upfront capital expenditures and significant risk that any potential product candidate will fail to demonstrate adequate effect or an acceptable safety profile, gain regulatory approval and become commercially viable. We have no products approved for commercial sale and have not generated any revenue from product sales to date, and we continue to incur significant research and development and other expenses related to our ongoing operations. As a result, we are not profitable and have incurred losses in each period since our inception in June 2015. For the years ended December 31, 2020 and 2019, we reported net losses of $74.9 million and $76.8 million, respectively. As of December 31, 2020, we had an accumulated deficit of $254.4 million. We expect to continue to incur significant losses for the foreseeable future, and we expect these losses to increase as we continue our research and development of, and seek regulatory approvals for, our product candidates.

Even if we succeed in commercializing one or more of our product candidates, we will continue to incur substantial research and development costs and other expenditures to develop and market additional product candidates. We may encounter unforeseen expenses, difficulties, complications, delays and other unknown factors that may adversely affect our business. The size of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenue. Our prior losses and expected future losses have had and will continue to have an adverse effect on our stockholders' equity and working capital.

We will require additional capital to fund our operations and if we fail to obtain necessary financing, we will not be able to complete the development and commercialization of our product candidates.

Our operations have consumed substantial amounts of cash since our inception. We expect to continue to spend substantial amounts of cash (including the net proceeds from our initial public offering, or IPO, and our follow-on public offerings in May 2019 and June 2020) to conduct further research and development and preclinical testing and clinical trials of our product candidates, to seek regulatory approvals for our product candidates and to launch and commercialize any product candidates for which we receive regulatory approval, including potentially building our own commercial organization to address the U.S., the European Union and certain other markets. As of December 31, 2020, we had approximately $148.8 million in cash, cash equivalents and marketable securities. Our monthly spending levels will vary based on new and ongoing development and corporate activities. Because the length of time and activities associated with successful development of our product candidates is highly uncertain, we are unable to estimate the actual funds we will require for development and any approved marketing and commercialization activities. Our future funding requirements, both near and long-term, will depend on many factors, including, but not limited to:

- the initiation, progress, timing, costs and results of preclinical studies and clinical trials for our product candidates;
- the clinical development plans we establish for these product candidates;
- the number and characteristics of product candidates that we develop or may in-license;
- the terms of any collaboration agreements we may choose to conclude;
- the outcome, timing and cost of meeting regulatory requirements established by the FDA, the European Medical Agency, or EMA, and other comparable foreign regulatory authorities;
- the cost of filing, prosecuting, defending and enforcing our patent claims and other intellectual property rights;

- the cost of defending intellectual property disputes, including patent infringement actions brought by third parties against us or our product candidates;
- the effect of competing technological and market developments;
- the cost and timing of completion of commercial-scale outsourced manufacturing activities; and
- the cost of establishing sales, marketing and distribution capabilities for any product candidates for which we may receive regulatory approval in regions where we choose to commercialize our products on our own.

We cannot be certain that additional funding will be available on acceptable terms, or at all. If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us, we may have to significantly delay, scale back or discontinue the development or commercialization of one or more of our product candidates or one or more of our other research and development initiatives. We also could be required to seek collaborators for one or more of our current or future product candidates at an earlier stage than otherwise would be desirable or on terms that are less favorable than might otherwise be available or relinquish or license on unfavorable terms our rights to technologies or product candidates that we otherwise would seek to develop or commercialize ourselves.

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

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

We may seek additional capital through a combination of public and private equity offerings, debt financings, strategic partnerships and alliances and licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholder's ownership interest will be diluted, and the terms may include liquidation or other preferences that adversely affect our stockholder's rights. The incurrence of indebtedness would result in increased fixed payment obligations and could involve certain restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. If we raise additional funds through strategic partnerships and alliances and licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies or product candidates or grant licenses on terms unfavorable to us.

Our company has a limited operating history and no history of commercializing pharmaceutical products, which may make it difficult to evaluate the prospects for our future viability.

We are a clinical stage company. We were founded and commenced operations in June 2015. Our operations to date have been limited to organizing and staffing our company, business planning, raising capital, acquiring and developing our technology, identifying potential product candidates, and undertaking preclinical studies and clinical trials. Although we have initiated clinical trials for MGTA-145 and MGTA-456, we have not yet demonstrated an ability to successfully complete clinical trials of our product candidates; obtain marketing approvals; manufacture a commercial-scale medicine, or arrange for a third party to do so on our behalf; or conduct sales and marketing activities necessary for successful commercialization. Typically, it takes about 10 to 15 years to develop a new medicine from the time it is discovered to when it is available for treating patients. Consequently, any predictions we make about our future success or viability may not be as accurate as they could be if we had a longer operating history.

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

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

Our ability to generate revenue from product sales and achieve profitability depends on our ability, alone or with collaborative partners, to successfully complete the development of, and obtain the regulatory approvals necessary to commercialize, product candidates we may identify for development. We may not generate revenues from product sales for the next several years, if ever. Our ability to generate future revenues from product sales depends heavily on our, or our collaborators', ability to successfully:

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

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

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

We have limited director and officer insurance and commercial insurance policies. Any significant insurance claims would have a material adverse effect on our business, financial condition and results of operations. Insurance availability, coverage terms and pricing continue to vary with market conditions. We endeavor to obtain appropriate insurance coverage for insurable risks that we identify; however, we may fail to correctly anticipate or quantify insurable risks, we may not be able to obtain appropriate insurance coverage, and

insurers may not respond as we intend to cover insurable events that may occur. We have observed rapidly changing conditions in the insurance markets relating to nearly all areas of traditional corporate insurance. Such conditions have resulted in higher premium costs, higher policy deductibles and lower coverage limits. For some risks, we may not have or maintain insurance coverage because of cost or availability.

Risks Related to Product Development and Regulatory Approval

We are early in our development efforts. If we are unable to advance our product candidates to obtain regulatory approval and ultimately commercialize our product candidates, or experience significant delays in doing so, our business will be materially harmed.

We are early in our development efforts for our product candidates, including MGTA-145. Our ability to generate product revenue, which we do not expect will occur for many years, if ever, will depend heavily on the successful development and eventual commercialization of our product candidates, which may never occur. We currently generate no revenue from sales of any product, and we may never be able to develop or commercialize a marketable product.

Each of our programs and product candidates will require additional preclinical and clinical development; regulatory approval in multiple jurisdictions; obtaining manufacturing supply, capacity and expertise; building of a commercial organization; substantial investment and significant marketing efforts before we generate any revenue from product sales. Our product candidates must be authorized for marketing by the FDA, or certain other foreign regulatory agencies, such as the EMA, before we may commercialize our product candidates.

The success of our product candidates will depend on several factors, including the following:

- successful completion of preclinical studies and successful enrollment and completion of clinical trials, including toxicology studies, biodistribution studies and minimally efficacious dose studies in animals, where applicable, under the FDA's current Good Clinical Practices, or cGCPs, and the FDA's current Good Laboratory Practices;
- effective IND applications or Clinical Trial Authorizations that allow commencement of our planned clinical trials or future clinical trials for our product candidates;
- positive results from our future clinical programs that support a finding of safety and effectiveness and an acceptable risk-benefit profile of our product candidates in the intended populations;
- receipt of regulatory approvals from applicable regulatory authorities;
- establishment of arrangements with third-party manufacturers for clinical supply and, where applicable, commercial manufacturing capabilities;
- successful development of our internal manufacturing processes or transfer to larger-scale facilities operated by either a CMO or by us;
- establishment and maintenance of patent and trade secret protection or regulatory exclusivity for our product candidates;
- commercial launch of our product candidates, if and when approved, whether alone or in collaboration with others;
- acceptance of our product candidates, if and when approved, by patients, the medical community and third-party payors;
- effective competition with other therapies;
- establishment and maintenance of healthcare coverage and adequate reimbursement;
- enforcement and defense of intellectual property rights and claims; and
- maintenance of a continued acceptable safety profile of our product candidates following approval.

If we do not succeed in one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize our product candidates, which would materially harm our business. If we do not receive regulatory approvals for our product candidates, we may not be able to continue our operations.

Our ongoing and planned clinical trials or those of our collaborators may reveal significant adverse events not seen in our preclinical studies and may result in a safety profile that could inhibit regulatory approval or market acceptance of any of our product candidates.

Before obtaining regulatory approvals for the commercial sale of our product candidates, we must demonstrate through lengthy, complex and expensive preclinical testing and clinical trials that our product candidates are both safe and effective for use in each target indication. Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. The results of preclinical studies and early clinical trials of our product candidates may not be predictive of the results of later-stage clinical trials. There is typically an extremely high rate of attrition from the failure of product candidates proceeding through clinical trials. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy profile despite having progressed through preclinical studies and initial clinical trials. A number of companies in the biopharmaceutical industry have suffered significant setbacks in advanced clinical trials due to lack of efficacy or unacceptable safety issues, notwithstanding promising results in earlier trials. Most product candidates that commence clinical trials are never approved as products.

If significant adverse events or other side effects are observed in any of our current or future clinical trials, we may have difficulty recruiting patients to the clinical trial, patients may drop out of our trial, or we may be required to abandon the trial or our development efforts of that product candidate altogether. We, the FDA or other applicable regulatory authorities, or an institutional review board, or IRB, may suspend clinical trials of a product candidate at any time for various reasons, including a belief that subjects in such trials are being exposed to unacceptable health risks or adverse side effects. Some potential therapeutics developed in the biotechnology industry that initially showed therapeutic promise in early-stage studies have later been found to cause side effects that prevented their further development. Even if the side effects do not preclude the drug from obtaining or maintaining marketing approval, undesirable side effects may inhibit market acceptance of the approved product due to its tolerability versus other therapies. Any of these developments could materially harm our business, financial condition and prospects.

Clinical development involves a lengthy and expensive process, with an uncertain outcome. We may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of any product candidates.

Our product candidates are in the preclinical development and clinical trial stages, and their risk of failure is high. It is impossible to predict when or if any of our programs will prove effective and safe in humans or will receive regulatory approval. Before obtaining marketing approval from regulatory authorities for the sale of any product candidate, we must complete preclinical development and then conduct extensive clinical trials to demonstrate the safety and efficacy of any of our future product candidates in humans. Preclinical and clinical testing is expensive, difficult to design and implement, can take many years to complete and is uncertain as to outcome. We may be unable to establish clinical endpoints that applicable regulatory authorities would consider clinically meaningful, and a clinical trial can fail at any stage of testing. The outcome of preclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of a clinical trial do not necessarily predict final results. Moreover, preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their products.

Successful completion of clinical trials is a prerequisite to submitting a new drug application, or NDA, or a biologics license application, or BLA, to the FDA, a Marketing Authorization Application to the EMA and similar approval filings to comparable foreign regulatory authorities, for each product candidate and, consequently, the ultimate approval and commercial marketing of any product candidates. We do not know whether any of our clinical trials will begin or be completed on schedule, if at all.

We may experience delays in completing our preclinical studies and initiating or completing clinical trials. For example, we staggered the initiation of our Phase 2 trials for MGTA-145 over the course of 2020 and 2021 due to the clinical trial impacts from COVID-19. We also may experience numerous unforeseen events during, or as a result of, any current or future clinical trials that we could conduct that could delay or prevent our ability to receive marketing approval or commercialize our product candidates, including:

- regulators, IRBs, or ethics committees may not authorize us or our investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;
- we may experience delays in reaching, or fail to reach, agreement on acceptable terms with prospective trial sites and prospective CROs, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- clinical trials of any product candidates may fail to show safety or efficacy, produce negative or inconclusive results and we may decide, or regulators may require us, to conduct additional preclinical studies or clinical trials or we may decide to abandon product development programs;
- the number of patients required for clinical trials of any product candidates may be larger than we anticipate, enrollment in these clinical trials may be slower than we anticipate, or participants may drop out of these clinical trials or fail to return for post-treatment follow-up at a higher rate than we anticipate;
- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all, or may deviate from the clinical trial protocol or drop out of the trial, which may require that we add new clinical trial sites or investigators;
- we may elect to, or regulators, IRBs or ethics committees may require, that we or our investigators, suspend or terminate clinical research or trials for various reasons, including noncompliance with regulatory requirements or a finding that the participants are being exposed to unacceptable health risks;
- the cost of preclinical studies and clinical trials of any product candidates may be greater than we anticipate;
- the supply or quality of our product candidates or other materials necessary to conduct clinical trials of our product candidates may be insufficient or inadequate; and
- our product candidates may have undesirable side effects or other unexpected characteristics, causing us or our investigators, regulators, IRBs or ethics committees to suspend or terminate the trials, or reports may arise from preclinical or clinical testing of other blood and immune reset and cell-based therapies that raise safety or efficacy concerns about our product candidates.

We could also encounter delays if a clinical trial is suspended or terminated by us, the IRBs of the institutions in which such trials are being conducted, the Data Safety Monitoring Board for such trial or FDA or other regulatory authorities. Such authorities may impose such a suspension or termination due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a product or treatment, failure to establish or achieve clinically meaningful trial endpoints, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial. In

addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates. Further, the FDA or other regulatory authorities may disagree with our clinical trial design and our interpretation of data from clinical trials or may change the requirements for approval even after they have reviewed and commented on the design for our clinical trials.

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

We have no experience as a company in obtaining regulatory approval for a drug.

As a company, we have never obtained regulatory approval for, or commercialized, a drug. It is possible that the FDA may refuse to accept any or all future NDA or BLAs for substantive review or may conclude after review of our data that our application is insufficient to obtain regulatory approval for any current or future product candidates. If the FDA does not approve any future NDAs or BLAs, it may require that we conduct additional costly clinical, preclinical or manufacturing validation studies before it will reconsider our applications. Depending on the extent of these or any other FDA-required studies, approval of any NDA or BLA or other application that we submit may be significantly delayed, possibly for several years, or may require us to expend more resources than we have available. Any failure or delay in obtaining regulatory approvals would prevent us from commercializing MGTA-145 or any other product candidate, generating revenues and achieving and sustaining profitability. It is also possible that additional studies, if performed and completed, may not be considered sufficient by the FDA to approve any NDA or other application that we submit. If any of these outcomes occur, we may be forced to abandon the development of our product candidates, which would materially adversely affect our business and could potentially cause us to cease operations. We face similar risks for our applications in foreign jurisdictions.

If serious adverse events, undesirable side effects, or unexpected characteristics are identified during the development of any product candidates we may develop, we may need to abandon or limit our further clinical development of those product candidates.

It is impossible to predict when or if any product candidates we may develop will prove safe in humans. If any product candidates we develop are associated with serious adverse events, or undesirable side effects, or have characteristics that are unexpected, we may need to abandon their development or limit development to certain uses or subpopulations in which the serious adverse events, undesirable side effects or other characteristics are less prevalent, less severe, or more acceptable from a risk-benefit perspective, any of which would have a material adverse effect on our business, financial condition, results of operations, and prospects. It is possible that product candidates that initially showed promise in early stage testing will later have been found to cause side effects that prevent further clinical development of the product candidates.

Stem Cell Transplant is a high-risk procedure with curative potential that may result in complications or adverse events for patients in our clinical trials or for patients that use any of our product candidates, if approved.

Stem cell transplant can cure patients across multiple diseases, but its use carries with it risks of toxicity, serious adverse events and death. Because many of our therapies are used to prepare or treat patients undergoing stem cell transplant, patients in our clinical trials or patients that use any of our product candidates may be

subject to many of the risks that are currently inherent to this procedure. In particular, stem cell transplant involves certain known potential post-procedure complications that may manifest several weeks or months after a transplant and which may be more common in certain patient populations. For example, up to 20% of patients with inherited metabolic disorders treated with a transplant experience primary engraftment failure, resulting in severe complications, including death. Another example is autoimmune cytopenia, a known and severe frequent complication of the transplant procedure in patients with non-malignant diseases such as inherited metabolic diseases, that can result in death. If these or other serious adverse events, undesirable side effects, or unexpected characteristics are identified during the development of any of our product candidates, we may need to limit, delay or abandon our further clinical development of those product candidates, even if such events, effects or characteristics were the result of stem cell transplant or related procedures generally, and not directly or specifically caused or exacerbated by our product candidates. All serious adverse events or unexpected side effects are continually monitored per the clinical trial's approved protocol. If serious adverse events are determined to be directly or specifically caused or exacerbated by our product candidates, we would follow the trial protocol's requirements, which call for our data safety monitoring committee to review all available clinical data in making a recommendation regarding the trial's continuation.

If we are not able to identify a safe and effective dose for any of our antibody drug conjugates, or ADCs, we may need to delay, abandon or limit our development of any potential product candidates.

ADCs utilize toxins to kill cells, and we may not be able to identify a safe and effective dose for some of our potential product candidates. ADCs, including those that have received marketing approval, have dose-dependent safety findings that can include liver toxicity, depending on the target of the ADC and the drug used in the conjugate. In addition, ADCs may have other adverse side effects including fatalities. Although our CD117-ADC, which was designed to deplete hematopoietic stem cells, or HSCs, was generally well tolerated at efficacious doses in non-human primate studies, we may not be able to ultimately show that MGTA-117 can deplete HSCs at a safe and effective dose in humans and we may need to delay, abandon or limit these development efforts. Further, MGTA-117 utilizes an amanitin toxin that has not been tested as an ADC toxin in humans before. Other companies, for example Heidelberg Pharma, are developing ADCs with amanitin toxins and are expected to enter clinical trials. Heidelberg Pharma has filed an IND with the FDA that has been accepted. If such trials encounter safety or efficacy issues, especially if related to the amanitin toxin, then our MGTA-117 program may be adversely affected.

Even if we obtain regulatory approval of any of our product candidates, the approved products may be subject to post-approval studies and will remain subject to ongoing regulatory requirements. If we fail to comply, or if concerns are identified in subsequent studies, our approval could be withdrawn, and our product sales could be suspended.

If we are successful at obtaining regulatory approval for MGTA-145 or any of our other product candidates, regulatory agencies in the U.S. and other countries where a product will be sold may require extensive additional clinical trials or post-approval clinical trials that are expensive and time-consuming to conduct. In particular, therapeutic products administered for the treatment of certain inherited metabolic disorders, such as Hurler syndrome and leukodystrophies, are likely to require extensive follow-up studies and close monitoring of patients after regulatory approval has been granted, for any signs of adverse effects that occur over a long period of time. These studies may be expensive and time-consuming to conduct and may reveal side effects or other harmful effects in patients that use our therapeutic products after they are on the market, which may result in the limitation or withdrawal of our drugs from the market. Alternatively, we may not be able to conduct such additional trials, which might force us to abandon our efforts to develop or commercialize certain product candidates. Even if post-approval studies are not requested or required, after our products are approved and on the market, there might be safety issues that emerge over time that require a change in product labeling, additional postmarket studies or clinical trials, imposition of distribution and use restrictions under a Risk Evaluation and Mitigation Strategy, or REMS, or withdrawal of the product from the market, which would cause our revenue to decline.

Additionally, any products that we may successfully develop will be subject to ongoing regulatory requirements after they are approved. These requirements will govern the manufacturing, packaging, marketing, distribution, and use of our products. If we fail to comply with such regulatory requirements, approval for our products may be withdrawn, and product sales may be suspended. We may not be able to regain compliance, or we may only be able to regain compliance after a lengthy delay, significant expense, lost revenues and damage to our reputation.

Because we are developing product candidates for the treatment of diseases in which there is little clinical experience using new technologies, there is increased risk that the FDA, the EMA, or other regulatory authorities may not consider the endpoints of our clinical trials to provide clinically meaningful results and that these results may be difficult to analyze.

During the regulatory review process, we will need to identify success criteria and endpoints such that the FDA, the EMA, or other regulatory authorities will be able to determine the clinical efficacy and safety profile of any product candidates we may develop. As we are initially seeking to identify and develop product candidates to treat diseases in which there is little clinical experience using new technologies, there is heightened risk that the FDA, the EMA, or other regulatory authorities may not consider the clinical trial endpoints that we propose to provide clinically meaningful results (reflecting a tangible benefit to patients). In addition, the resulting clinical data and results may be difficult to analyze. Even if the FDA does find our success criteria to be sufficiently validated and clinically meaningful, we may not achieve the pre-specified endpoints to a degree of statistical significance. This may be a particularly significant risk for many of the genetically defined diseases for which we plan to develop product candidates because many of these diseases have small patient populations and designing and executing a rigorous clinical trial with appropriate statistical power is more difficult than with diseases that have larger patient populations. Further, even if we do achieve the pre-specified criteria, we may produce results that are unpredictable or inconsistent with the results of the non-primary endpoints or other relevant data. The FDA also weighs the benefits of a product against its risks, and the FDA may view the efficacy results in the context of safety as not being supportive of regulatory approval. Other regulatory authorities in the European Union and other countries, such as the Committee for Advanced Therapies may make similar comments with respect to these endpoints and data. Any product candidates we may develop will be based on a novel technology that makes it difficult to predict the time and cost of development and of subsequently obtaining regulatory approval.

A Breakthrough Therapy Designation by the FDA, even if granted for any of our product candidates, may not lead to a faster development or regulatory review or approval process and it does not increase the likelihood that our product candidates will receive marketing approval.

We plan to seek a Breakthrough Therapy Designation for our product candidates if the clinical data support such a designation for one or more product candidates. A breakthrough therapy is defined as a drug or biologic that is intended, alone or in combination with one or more other drugs or biologics, to treat a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the drug, or biologic, may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. For product candidates that have been designated as breakthrough therapies, interaction and communication between the FDA and the sponsor of the trial can help to identify the most efficient path for clinical development while minimizing the number of patients placed in ineffective control regimens. Drugs and biologics designated as breakthrough therapies by the FDA may also be eligible for accelerated approval.

Designation as a breakthrough therapy is within the discretion of the FDA. Accordingly, even if we believe one of our product candidates meets the criteria for designation as a breakthrough therapy, the FDA may disagree and instead determine not to make such designation. In any event, the receipt of a Breakthrough Therapy Designation for a product candidate may not result in a faster development process, review or approval compared to drugs considered for approval under non-expedited FDA review procedures and does not assure ultimate

approval by the FDA. In addition, even if one or more of our product candidates qualify as breakthrough therapies, the FDA may later decide that the product no longer meets the conditions for qualification.

The regenerative medicine advanced therapy, or RMAT, designation by the FDA for any of our product candidates may not lead to a faster development or regulatory review or approval process and it does not increase the likelihood that our product candidates will receive marketing approval.

We plan to seek an RMAT designation for our product candidates if the clinical data support such a designation for one or more product candidates. An RMAT is defined as cell and gene therapies, therapeutic tissue engineering products, human cell and tissue products, and combination products using any such therapies or products. Gene therapies, including genetically modified cells that lead to a durable modification of cells or tissues may meet the definition of a regenerative medicine therapy. The RMAT program is intended to facilitate efficient development and expedite review of RMATs, which are intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition and for which preliminary clinical evidence indicates that the drug has the potential to address unmet medical needs for such disease or condition. A BLA for a regenerative medicine therapy that has received RMAT designation may be eligible for priority review or accelerated approval. An RMAT may be eligible for priority review if it treats a serious condition, and, if approved would provide a significant improvement in the safety or effectiveness of the treatment of the condition. An RMAT may be eligible for accelerated approval through (1) surrogate or intermediate endpoints reasonably likely to predict long-term clinical benefit or (2) reliance upon data obtained from a meaningful number of sites. Benefits of such designation also include early interactions with the FDA to discuss any potential surrogate or intermediate endpoint to be used to support accelerated approval. A regenerative medicine therapy with RMAT designation that is granted accelerated approval and is subject to post-approval requirements may fulfill such requirements through the submission of clinical evidence from clinical trials, patient registries, or other sources of real world evidence, such as electronic health records; the collection of larger confirmatory data sets; or post-approval monitoring of all patients treated with such therapy prior to its approval.

Designation as an RMAT is within the discretion of the FDA. Accordingly, even if we believe one of our product candidates meets the criteria for designation as a RMAT, the FDA may disagree and instead determine not to make such designation. In any event, the receipt of RMAT designation for our product candidates may not result in a faster development process, review or approval compared to drugs considered for approval under conventional FDA procedures and does not assure ultimate approval by the FDA. In addition, even if one or more of our product candidates qualify for RMAT designation, the FDA may later decide that the biological products no longer meet the conditions for qualification.

Our current product candidates and future product candidates may not be eligible for Orphan Drug status.

The FDA granted Orphan Drug designation to MGTA-145 for the mobilization of HSCs to the peripheral blood for collection and subsequent transplant in May 2020 and we plan to seek Orphan Drug designation for our other product candidates if the clinical data support such a designation. The U.S. and Europe may designate drugs for relatively small patient populations as orphan drugs. Orphan Drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process, but does make the product eligible for orphan drug exclusivity, reduced filing fees and specific tax credits. Generally, if a company receives the first marketing approval for a product with an Orphan Drug designation in the clinical indication for which it has such designation, the product is entitled to orphan drug exclusivity. Orphan drug exclusivity means that the FDA will not approve another application to market the same drug for the same indication, except in limited circumstances, for a period of seven years in the U.S. This exclusivity, however, could block the approval of our proposed product candidates if a competitor obtains marketing approval before us. However, even if we obtain orphan drug exclusivity for any of our proposed product candidates, we may not be able to maintain it. For example, if a competitive product is shown to be clinically superior to our product candidates, any orphan drug exclusivity we have will not block the approval of such competitive product.

If we encounter difficulties enrolling patients in our clinical trials, our clinical development activities could be delayed or otherwise adversely affected.

We may experience difficulties in patient enrollment in our clinical trials for a variety of reasons, including impacts that have resulted, or may in the future result, from the COVID-19 pandemic. The timely completion of clinical trials in accordance with their protocols depends, among other things, on our ability to enroll a sufficient number of patients who remain in the trial until its conclusion. The enrollment of patients depends on many factors, including:

- the patient eligibility criteria defined in the protocol;
- the size of the patient population required for analysis of the trial's primary endpoints;
- the proximity of patients to trial sites;
- the design of the trial;
- our ability to recruit clinical trial investigators with the appropriate competencies and experience;
- our ability to obtain and maintain patient consents; and
- the risk that patients enrolled in clinical trials will drop out of the trials before completion.

In addition, our clinical trials will compete with other clinical trials for product candidates that are in the same therapeutic areas as our product candidates, and this competition will reduce the number and types of patients available to us, because 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. Since the number of qualified clinical investigators is limited, we expect to conduct some of our clinical trials at the same clinical trial sites that some of our competitors use, which will reduce the number of patients who are available for our clinical trials in such clinical trial site.

Delays in patient enrollment may result in increased costs or may affect the timing or outcome of the planned clinical trials, which could prevent completion of these trials and adversely affect our ability to advance the development of our product candidates.

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

Because we have limited financial and managerial resources, we focus on research programs and product candidates that we identify for specific indications among many potential options. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial medicines or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable medicines. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing, or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. Any such event could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Even if we complete the necessary clinical trials, we cannot predict when, or if, we will obtain regulatory approval to commercialize a product candidate we may develop, and any such approval may be for a more narrow indication than we seek.

We cannot commercialize a product candidate until the appropriate regulatory authorities have reviewed and approved the product candidate. Even if any product candidates we may develop meet their safety and efficacy

endpoints in clinical trials, the regulatory authorities may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval. Additional delays may result if an FDA Advisory Committee or other regulatory authority recommends non-approval or restrictions on approval. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory authority policy during the period of product development, clinical trials, and the review process.

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

A Fast Track Designation by the FDA, even if granted for any of our product candidates, may not lead to a faster development or regulatory review or approval process, and does not increase the likelihood that our product candidates will receive marketing approval.

If a drug is intended for the treatment of a serious or life-threatening condition and the drug demonstrates the potential to address unmet medical needs for this condition, the drug sponsor may apply for FDA Fast Track Designation for a particular indication. Marketing applications filed by sponsors of products in Fast Track development may qualify for priority review under the policies and procedures offered by the FDA, but the Fast Track Designation does not assure any such qualification or ultimate marketing approval by the FDA. Receipt of Fast Track Designation may not result in a faster development process, review or approval compared to drugs considered for approval under conventional FDA procedures. In addition, the FDA may withdraw any Fast Track Designation at any time. We may seek Fast Track Designation for our product candidates, but there is no assurance that the FDA will grant this status to any of our proposed product candidates.

We may seek priority review designation for our product candidates, but we might not receive such designation, and even if we do, such designation may not lead to a faster development or regulatory review or approval process.

If the FDA determines that a product candidate offers a treatment for a serious condition and, if approved, the product would provide a significant improvement in safety or effectiveness, the FDA may designate the product candidate for priority review. A priority review designation means that the goal for the FDA to review an application is six months, rather than the standard review period of ten months. We may request priority review for our product candidates, however, we cannot assume that our product candidates will meet the criteria for that designation. The FDA has broad discretion with respect to whether or not to grant priority review status to a product candidate, so even if we believe a particular product candidate is eligible for such designation or status, the FDA may decide not to grant it. Moreover, a priority review designation does not necessarily mean a faster development or regulatory review or approval process or necessarily confer any advantage with respect to approval compared to conventional FDA procedures. Receiving priority review from the FDA does not guarantee approval within the six-month review cycle or at all.

Results of preclinical studies and early clinical trials may not be predictive of results of future clinical trials, and such results do not guarantee approval of a product candidate by regulatory authorities.

The outcome of preclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of clinical trials do not necessarily predict success in the results of completed clinical trials. Many companies in the pharmaceutical and biotechnology industries have suffered significant

setbacks in late-stage clinical trials after achieving positive results in earlier development, and we could face similar setbacks. The design of a clinical trial can determine whether its results will support approval of a product and flaws in the design of a clinical trial may not become apparent until the clinical trial is well advanced. In addition, preclinical and clinical data are often susceptible to varying interpretations and analyses. Many companies that believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain regulatory approval for their product candidates. Even if we complete clinical development of MGTA-145 or any other product candidates, there can be no assurance that the FDA, EMA, or other regulatory authorities will approve MGTA-145 or any other product candidates for marketing. Additionally, as of June 23, 2020, the FDA noted it is continuing to ensure timely reviews of applications for medical products during the COVID-19 pandemic in line with its user fee performance goals, however, the FDA may not be able to continue its current pace and approval timelines could be extended, including where a pre-approval inspection or an inspection of clinical sites is required and, due to the COVID-19 pandemic and travel restrictions, the FDA is unable to complete such required inspections during the review period. In 2020, several companies announced receipt of complete response letters due to the FDA's inability to complete required inspections for their applications.

In some instances, there can be significant variability in safety or efficacy results between different clinical trials of the same product candidate due to numerous factors, including changes in trial procedures set forth in protocols, differences in the size and type of the patient populations, changes in and adherence to the dosing regimen and other clinical trial procedures and the rate of dropout among clinical trial participants. If we fail to receive positive results in clinical trials of our product candidates, the development timeline and regulatory approval and commercialization prospects for our most advanced product candidate, and, correspondingly, our business and financial prospects would be negatively impacted.

Our product candidates for which we intend to seek approval may face competition from generic drugs or biosimilars sooner than anticipated.

With the enactment of the Biologics Price Competition and Innovation Act of 2009, or BPCIA, an abbreviated pathway for the approval of biosimilar and interchangeable biological products was created. The abbreviated regulatory pathway establishes legal authority for the FDA to review and approve biosimilar biologics, including the possible designation of a biosimilar as interchangeable based on its similarity to an existing reference product. Under the BPCIA, an application for a biosimilar product cannot be approved by the FDA until 12 years after the original branded product is approved under a BLA. On March 6, 2015, the FDA approved the first biosimilar product under the BPCIA. However, the law is complex and is still being interpreted and implemented by the FDA. As a result, its ultimate impact, implementation, and meaning are subject to uncertainty. While it is uncertain when such processes intended to implement BPCIA may be fully adopted by the FDA, any such processes could have a material adverse effect on the future commercial prospects for our biological products.

We believe that if any of our product candidates are approved as a biological product under a BLA it should qualify for the 12-year period of exclusivity. However, there is a risk that the FDA will not consider any of our product candidates to be reference products for competing products, potentially creating the opportunity for biosimilar competition sooner than anticipated. Additionally, this period of regulatory exclusivity does not apply to companies pursuing regulatory approval via their own traditional BLA, rather than via the abbreviated pathway. 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. Finally, there has been public discussion of potentially decreasing the period of exclusivity from the current 12 years. If such a change were to be enacted, our product candidates, if approved, could have a shorter period of exclusivity than anticipated.

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

In the U.S. and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could, among other things, prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to profitably sell any products for which we obtain marketing approval.

For example, in March 2010, the Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the ACA, was enacted to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for health care and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms. As implementation of the ACA is ongoing, the law appears likely to continue the downward pressure on pharmaceutical pricing, especially under the Medicare program, and may also increase our regulatory burdens and operating costs.

Moreover, the Drug Supply Chain Security Act imposes new obligations on manufacturers of pharmaceutical products related to product tracking and tracing. Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. We are not sure whether additional legislative changes will be enacted, or whether the current regulations, guidance or interpretations will be changed, or what the impact of such changes on our business, if any, may be.

We will be competing against numerous large, established companies that have substantially greater financial, technical, research, manufacturing, marketing, distribution and other resources than us, and we will be at a significant competitive disadvantage.

The pharmaceutical and biopharmaceutical industry is characterized by intense competition and rapid and significant technological changes and advancements. Many companies, research institutions and universities are doing research and development work in a number of areas similar to those that we focus on that could lead to the development of new products which could compete with and be superior to our product candidates.

Most of the companies with which we compete have substantially greater financial, technical, research, manufacturing, marketing, distribution and other resources than those of ours. A number of these companies may have or may develop technologies for developing products for treating various diseases, including certain inherited metabolic disorders such as Hurler syndrome and leukodystrophies, that could prove to be superior to ours. We expect technological developments in the pharmaceutical and biopharmaceutical and related fields to occur at a rapid rate, and we believe competition will intensify as advances in these fields are made. Accordingly, we will be required to continue to devote substantial resources and efforts to research and development activities in order to potentially achieve and maintain a competitive position in this field. Products that we develop may become obsolete before we are able to market them or to recover all or any portion of our research and development expenses. We will be competing with respect to our products with companies that have significantly more experience and expertise in undertaking preclinical testing and human clinical trials with new or improved therapeutic products and obtaining regulatory approvals of such products. A number of these companies already market and may be in advanced phases of clinical testing of various drugs that will or may compete with our current product candidates or other future potential product candidates. Our competitors may develop or commercialize products more rapidly than we do or with significant advantages over any products we develop. Our competitors may therefore be more successful in commercializing their products than we are, which could adversely affect our competitive position and business.

In addition to larger pharmaceutical or biopharmaceutical companies that may develop different competing technologies or technologies, we will be competing with a number of smaller biotechnology companies. We are

aware that collaborations between smaller companies and larger established companies may compete with our programs. Colleges, universities, governmental agencies and other public and private research organizations are becoming more active in seeking patent protection and licensing arrangements to collect royalties for use of technologies that they have developed, some of which may be directly competitive with our programs and product candidates. For additional information regarding our competition, see “Item 1. Business – Competition” in our Annual Report on Form 10-K.

Risks Related to Manufacturing and Commercialization

We rely on third parties to conduct our preclinical and clinical trials and will rely on them to perform other tasks for us. If these third parties do not successfully carry out their contractual duties, meet expected deadlines or comply with regulatory requirements, we may not be able to obtain regulatory approval for or commercialize our product candidates and our business could be substantially harmed.

Although we have recruited a team that has experience with clinical trials, as a company we have no experience in conducting clinical trials. Moreover, we do not have the ability to independently conduct preclinical studies and clinical trials, and we have relied upon, and plan to continue to rely upon medical institutions, clinical investigators, contract laboratories and other third parties, or our CROs, to conduct preclinical studies and future clinical trials for our product candidates. We expect to rely heavily on these parties for execution of preclinical and future clinical trials for our product candidates and control only certain aspects of their activities. Nevertheless, we will be responsible for ensuring that each of our preclinical and clinical trials is conducted in accordance with the applicable protocol, legal and regulatory requirements and scientific standards and our reliance on CROs will not relieve us of our regulatory responsibilities. For any violations of laws and regulations during the conduct of our preclinical studies and clinical trials, we could be subject to warning letters or enforcement action that may include civil penalties up to and including criminal prosecution.

We and our CROs will be required to comply with regulations, including cGCPs for conducting, monitoring, recording and reporting the results of preclinical and clinical trials to ensure that the data and results are scientifically credible and accurate and that the trial patients are adequately informed of the potential risks of participating in clinical trials and their rights are protected. These regulations are enforced by the FDA, the Competent Authorities of the Member States of the European Economic Area and comparable foreign regulatory authorities for any drugs in clinical development. The FDA enforces cGCP regulations through periodic inspections of clinical trial sponsors, principal investigators and trial sites. If we or our CROs fail to comply with applicable cGCPs, the clinical data generated in our 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 assure you that, upon inspection, the FDA will determine that any of our future clinical trials will comply with cGCPs. In addition, our clinical trials must be conducted with product candidates produced in accordance with the requirements in the FDA’s current Good Manufacturing Practices, or cGMPs, requirements. Our failure or the failure of our CROs to comply with these regulations may require us to repeat clinical trials, which would delay the regulatory approval process and could also subject us to enforcement action.

Although we intend to design our planned clinical trials for our product candidates, for the foreseeable future CROs will conduct all of our planned clinical trials. As a result, many important aspects of our development programs, including their conduct and timing, will be outside of our direct control. Our reliance on third parties to conduct future preclinical studies and clinical trials will also result in less day-to-day control over the management of data developed through preclinical studies and clinical trials than would be the case if we were relying entirely upon our own staff.

If any of our relationships with these third-party CROs terminate, we may not be able to enter into arrangements with alternative CROs. If CROs 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 clinical data they obtain is compromised due to the failure to adhere to our clinical protocols, regulatory requirements or for other reasons, any preclinical studies or clinical trials with which such CROs are associated with may be extended, delayed or terminated. In such cases, we may not be able to obtain regulatory approval for or successfully commercialize our product candidates. As a result, our financial results and the commercial prospects for our product candidates in the subject indication could be harmed, our costs could increase and our ability to generate revenue could be delayed.

The successful development of biopharmaceuticals and cell-based therapies is highly uncertain.

Successful development of biopharmaceuticals and cell-based therapies is highly uncertain and is dependent on numerous factors, many of which are beyond our control. Blood and immune reset and cell-based therapies that appear promising in the early phases of development may fail to reach the market for several reasons including:

- preclinical study results may show the therapies to be less effective than desired or to have harmful or problematic side effects;
- clinical trial results may show the therapies to be less effective than expected (e.g., the trial failed to meet its primary endpoint) or to have unacceptable side effects or toxicities;
- failure to receive the necessary regulatory approvals or a delay in receiving such approvals. Among other things, such delays may be caused by slow enrollment in clinical trials, length of time to achieve study endpoints, additional time requirements for data analysis, or biologics license application, or BLA, preparation, discussions with the FDA, an FDA request for additional preclinical or clinical data, or unexpected safety or manufacturing issues;
- manufacturing costs, formulation issues, pricing or reimbursement issues, or other factors that make the therapy uneconomical; and
- the proprietary rights of others and their competing products and technologies that may prevent the therapy from being commercialized.

Success in preclinical studies and early clinical trials do not ensure that large-scale clinical trials will be successful. The length of time necessary to complete clinical trials and to submit an application for marketing approval for a final decision by a regulatory authority varies significantly from one therapy to the next, and may be difficult to predict.

Even if we are successful in getting market approval, commercial success of any of our product candidates will also depend in large part on the availability of coverage and adequate reimbursement from third-party payers, including government payers such as the Medicare and Medicaid programs and managed care organizations, which may be affected by existing and future health care reform measures designed to reduce the cost of health care. Third-party payers could require us to conduct additional studies, including post-marketing studies related to the cost effectiveness of a product, to qualify for reimbursement, which could be costly and divert our resources. If government and other health care payers were not to provide adequate coverage and reimbursement levels for any of our products if approved, market acceptance and commercial success would be reduced.

In addition, if one of our product candidates is approved for marketing, we will be subject to significant regulatory obligations regarding the submission of safety and other post-marketing information and reports and registration, and will need to continue to comply (or ensure that our third party providers) comply with the FDA's cGMPs and cGCPs requirements for any clinical trials that we conduct post-approval. In addition, there is always the risk that we or a regulatory authority might identify previously unknown problems with a product post-approval, such as adverse events of unanticipated severity or frequency. Compliance with these requirements is costly, and any failure to comply or other issues with our product candidates' post-market approval could have a material adverse effect on our business, financial condition and results of operations.

We may never obtain FDA approval for any of our product candidates in the U.S., and even if we do, we may never obtain approval for or commercialize any of our product candidates in any other jurisdiction, which would limit our ability to realize their full market potential.

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

Any contamination in our or our third parties' manufacturing process, shortages of raw materials or reagents or failure of any of our key suppliers to deliver necessary components of our product candidates could result in delays in our clinical development or marketing schedules.

Given the nature of biologics manufacturing, there is a risk of contamination. Any contamination could materially adversely affect our or our third-party vendors' ability to produce our product candidates on schedule and could therefore harm our results of operations and cause reputational damage.

The raw materials required in our and our third-party vendors' manufacturing processes are derived from biological sources. We cannot assure you that we or our third-party vendors have, or will be able to obtain on commercially reasonable terms, or at all, sufficient rights to these materials derived from biological sources. Such raw materials are difficult to procure and may also be subject to contamination or recall or be of insufficient quality. A material shortage, contamination, recall, or restriction on the use of biologically derived substances in the manufacture of our product candidates could adversely impact or disrupt the clinical and commercial manufacturing of our product candidates, which could materially and adversely affect our operating results and development timelines.

We rely on third-party suppliers for the supply and manufacture of certain components of our technology and product candidates, including a single supplier in some cases. Should our ability to procure the necessary components for our product candidates from our suppliers be compromised, our ability to continuously operate would be impaired until an alternative supplier is sourced, qualified and tested, which could delay or limit our ability to produce a clinical and commercial supply of our product candidates and harm our business.

If we use biological materials in a manner that causes injury, we may be liable for damages.

Our research and development activities involve the use of biological and hazardous materials. Although we believe our safety procedures for handling and disposing of these materials complies with federal, state and local laws and regulations, we cannot entirely eliminate the risk of accidental injury or contamination from the use, storage, handling or disposal of these materials. We do not carry specific biological waste insurance coverage or property and casualty and general liability insurance policies that include coverage for damages and fines arising from biological exposure or contamination. Accordingly, in the event of contamination or injury, we could be held liable for damages or penalized with fines in an amount exceeding our resources, and our clinical trials or regulatory approvals could be suspended or terminated.

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

In order to conduct clinical trials of MGTA-145, and our other current and future product candidates, we will need to work with third-party manufacturers to manufacture them in sufficient quantities. Our manufacturing partners or our third-party collaborators may be unable to successfully increase the manufacturing capacity of MGTA-145 and our other current or future product candidates in a timely or cost-effective manner, or at all. In addition, quality issues may arise during scale-up activities. If our manufacturing partners or collaborators are unable to successfully scale up the manufacture of our current or future product candidates in sufficient quality and quantity, the development, testing, and clinical trials of that product candidate may be delayed or infeasible, and marketing approval or commercial launch of any resulting product may be delayed or not obtained, which could significantly harm our business.

The commercial success of any of our product candidates will depend upon the degree of market acceptance by physicians, patients, third-party payors and others in the medical community.

Even with the requisite approvals from the FDA in the U.S., the EMA in the European Union and other regulatory authorities internationally, the commercial success of our product candidates will depend, in part, on the acceptance of physicians, patients and health care payors of our product candidates as medically necessary, cost-effective and safe. Any product that we commercialize may not gain acceptance by physicians, patients, health care payors and others in the medical community. If these products do not achieve an adequate level of acceptance, we may not generate significant product revenue and may not become profitable. Efforts to educate the medical community and third-party payors on the benefits of our product candidates may require significant resources, including management time and financial resources, and may not be successful. The degree of market acceptance of our product candidates, if approved for commercial sale, will depend on several factors, including:

- the efficacy, durability and safety of such product candidates as demonstrated in clinical trials;
- the potential and perceived advantages of product candidates over alternative treatments;
- the cost of treatment relative to alternative treatments;
- our ability to offer the product for sale at competitive prices;
- the clinical indications for which the product candidate is approved by the FDA or the EMA;
- the product's convenience and ease of administration compared to alternative treatments;
- the willingness of physicians to prescribe new therapies;
- the willingness of the target patient population to try new therapies;
- the prevalence and severity of any side effects;
- product labeling or product insert requirements of the FDA, EMA or other regulatory authorities, including any limitations or warnings contained in a product's approved labeling;
- relative convenience and ease of administration;
- the strength of marketing and distribution support;
- the timing of market introduction of competitive products;
- publicity concerning our products or competing products and treatments;
- changes in the standard of care for the targeted indications for the product; and
- sufficient third-party payor coverage and adequate reimbursement.

Even if a potential product displays a favorable efficacy and safety profile in preclinical studies and clinical trials, market acceptance of the product will not be fully known until after it is launched. Any failure by a current or potential product candidate of ours that obtains regulatory approval to achieve market acceptance or commercial success would adversely affect our business prospects.

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

We are developing our product candidates so that they can each be used individually or in combination with each other. In particular, we are focused on a product development strategy that includes leveraging the synergies among a comprehensive portfolio of our product candidates. Our success may depend, in part, on our ability to develop a complementary product portfolio with product candidates that, together or individually, will address the major opportunities inherent in the existing stem cell transplant process. Given our limited experience in developing product candidates that have received marketing approval, we may not be successful in developing some of our product candidates. The failure of one of our product candidates to obtain regulatory approval or market acceptance may affect our ability to expand our market opportunities for our other product candidates or programs. Although we may develop product candidates that ultimately obtain marketing approval, if we are unable to successfully develop our current programs into a comprehensive portfolio of product candidates, or experience significant delays in doing so, we may not realize the full commercial potential of our current and future product candidates.

Coverage and reimbursement may be limited or unavailable in certain market segments for our product candidates, if approved, which could make it difficult for us to sell any product candidates or therapies profitably.

The success of our product candidates, if approved, depends on the availability of adequate coverage and reimbursement from third-party payors. In addition, because our product candidates represent new approaches to blood and immune reset, we cannot be sure that coverage and reimbursement will be available for, or accurately estimate the potential revenue from our product candidates or assure that coverage and reimbursement will be available for any product that we may develop.

In the U.S. and markets in other countries, patients who are provided medical treatment for their conditions generally rely on third-party payors to reimburse all or part of the costs associated with their treatment. Adequate coverage and reimbursement from governmental healthcare programs, such as Medicare and Medicaid, and commercial payors are critical to new product acceptance.

Government authorities and third-party payors, such as private health insurers and health maintenance organizations, decide which drugs and treatments they will cover and the amount of reimbursement. Coverage may be more limited than the purposes for which the medicine is approved by the FDA or comparable foreign regulatory authorities. In the U.S., the principal decisions about reimbursement for new medicines are typically made by the Centers for Medicare & Medicaid Services, or CMS, an agency within the Department of Health and Human Services, or HHS. CMS decides whether and to what extent a new medicine will be covered and reimbursed under Medicare and private payors tend to follow CMS to a substantial degree. Coverage and reimbursement by a third-party payor may depend upon a number of factors, including the third-party payor’s determination that use of a product is:

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

For a drug product to receive federal reimbursement under the Medicaid or Medicare Part B programs or to be sold directly to U.S. government agencies, the manufacturer must extend discounts to entities eligible to participate in the 340B drug pricing program. The required 340B discount on a given product is calculated based on the "average manufacturer price" and Medicaid rebate amounts reported by the manufacturer. As of 2010, the ACA expanded the types of entities eligible to receive discounted 340B pricing, although, under the current state of the law, with the exception of children's hospitals, these newly eligible entities will not be eligible to receive discounted 340B pricing on orphan drugs. In addition, as 340B drug pricing is determined based on AMP and Medicaid rebate data, the revisions to the Medicaid rebate formula and average manufacturer price definition could cause the required 340B discount to increase.

Further, in the U.S., no uniform policy of coverage and reimbursement for products exists among third-party payors. As a result, obtaining coverage and reimbursement approval of a product from a government or other third-party payor is a time-consuming and costly process that could require us to provide to each payor supporting scientific, clinical and cost-effectiveness data for the use of our products on a payor-by-payor basis, with no assurance that coverage and adequate reimbursement will be obtained. Even if we obtain coverage for a given product, the resulting reimbursement payment rates might not be adequate for us to maintain pricing sufficient to achieve or sustain profitability or may require co-payments that patients find unacceptably high. Additionally, third-party payors may not cover, or provide adequate reimbursement for, long-term follow-up evaluations required following the use of product candidates. Patients are unlikely to use our product candidates unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost of our product candidates. Because our product candidates may have a higher cost of goods than conventional therapies, and may require long-term follow up evaluations, the risk that coverage and reimbursement rates may be inadequate for us to achieve profitability may be greater. There is significant uncertainty related to insurance coverage and reimbursement of newly approved products. It is difficult to predict at this time what third-party payors will decide with respect to the coverage and reimbursement for our product candidates.

Additionally, payment methodologies may be subject to changes in healthcare legislation and regulatory initiatives. For example, the Middle Class Tax Relief and Job Creation Act of 2012 required that CMS reduce the Medicare clinical laboratory fee schedule by 2% in 2013, which served as a base for 2014 and subsequent years. In addition, effective January 1, 2014, CMS also began bundling the Medicare payments for certain laboratory tests ordered while a patient received services in a hospital outpatient setting. Additional state and federal healthcare reform measures are expected to 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 certain pharmaceutical products or additional pricing pressures.

Moreover, increasing efforts by governmental and third-party payors in the U.S. and abroad to cap or reduce healthcare costs may cause such organizations to limit both coverage and the level of reimbursement for newly approved products and, as a result, they may not cover or provide adequate payment for our product candidates. There has been increasing legislative and enforcement interest in the U.S. with respect to specialty drug pricing practices. Specifically, there have been several recent Congressional inquiries and proposed federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. We expect to experience pricing pressures in connection with the sale of any of our product candidates due to the trend toward managed healthcare, the increasing influence of health maintenance organizations, cost containment initiatives and additional legislative changes.

Ongoing healthcare legislative and regulatory reform measures may have a material adverse effect on our business and results of operations.

Changes in regulations, statutes or the interpretation of existing regulations could impact our business in the future by requiring, for example: (1) changes to our manufacturing arrangements; (2) additions or modifications

to product labeling; (3) the recall or discontinuation of our products; or (4) additional record-keeping requirements. If any such changes were to be imposed, they could adversely affect the operation of our business.

In the U.S., there have been and continue to be a number of legislative initiatives to contain healthcare costs. For example, in March 2010 the ACA was passed, which substantially changes the way health care is financed by both governmental and private insurers, and significantly impacts the U.S. pharmaceutical industry. The ACA, among other things, subjects biological products to potential competition by lower-cost biosimilars, addresses a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected, expands the types of entities eligible for the 340B drug discount program, increases the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and extends the rebate program to individuals enrolled in Medicaid managed care organizations, establishes annual fees and taxes on manufacturers of certain branded prescription drugs, and creates a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 70% point-of-sale discounts (increased from 50% pursuant to the Bipartisan Budget Act of 2018, effective January 1, 2019) 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.

Some of the provisions of the ACA have yet to be fully implemented, while certain provisions have been subject to judicial and Congressional challenges, as well as efforts by the Trump administration to repeal or replace certain aspects of the ACA. While Congress has not passed comprehensive repeal legislation, some laws affecting the implementation of certain taxes under the ACA have been signed into law. For example, the TCJA includes a provision that decreased, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate," to $0. On December 14, 2018, a District Court Judge in the Northern District of Texas, ruled that the individual mandate is a critical and inseverable feature of the ACA, and therefore, because it was repealed as part of the TCJA, the remaining provisions of the ACA are invalid as well. The current administration and CMS have both stated that the ruling will have no immediate effect, and on December 18, 2019, the Fifth Circuit U.S. Court of Appeals held the individual mandate unconstitutional, and remanded the case to the lower court to reconsider its earlier invalidation of the full ACA. On March 2, 2020, the U.S. Supreme Court granted the petitions for writs of certiorari to review this case, and held oral arguments on November 10, 2020. It is unclear what effect this will have on the status of the ACA and our business. Congress may also consider other legislation to repeal or replace certain elements of the ACA.

In addition, since January 2017, President Trump has signed two Executive Orders designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. On January 20, 2017, President Trump signed an Executive Order directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from, or delay the implementation of any provision of the ACA that would impose a fiscal burden on states or a cost, fee, tax, penalty or regulatory burden on individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. Further, on October 13, 2017, President Trump signed an Executive Order terminating the cost-sharing subsidies that reimburse insurers under the ACA. Several state Attorneys General filed suit to stop the administration from terminating the subsidies, but their request for a restraining order was denied by a federal judge in California on October 25, 2017. On August 14, 2020, the U.S. Court of Appeals for the Federal Circuit ruled in two separate cases that the federal government is liable for the full amount of unpaid CSRs for the years preceding and including 2017. For CSR claims made by health insurance companies for years 2018 and later, further litigation will be required to determine the amounts due, if any. Further, on June 14, 2018, the U.S. Court of Appeals for the Federal Circuit ruled that the federal government was not required to pay more than $12 billion in ACA risk corridor payments to third-party payors who argued they were owed to them. On April 27, 2020, the U.S. Supreme Court reversed the U.S. Court of Appeals for the Federal Circuit decision and remanded the case to the U.S. Court of Federal Claims, concluding the government has an obligation to pay these risk corridor payments under the relevant formula. It is unclear what impact these rulings will have on our business.

In addition, CMS has published a final rule that, as of January 1, 2020, gives states greater flexibility in setting benchmarks for insurers in the individual and small group marketplaces, which may have the effect of relaxing the essential health benefits required under the ACA for plans sold through such marketplaces. Litigation and legislation over the ACA are likely to continue, with unpredictable and uncertain results.

Other legislative changes have been proposed and adopted in the U.S. since the ACA was enacted. On August 2, 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions of Medicare payments to providers of 2% per fiscal year. These reductions went into effect on April 1, 2013 and, due to subsequent legislative amendments to the statute, will remain in effect through 2030 unless additional congressional action is taken. However, pursuant to the Coronavirus Aid, Relief and Economic Security Act, or CARES Act, and subsequent legislation, these Medicare sequester reductions are suspended from May 1, 2020 through March 31, 2020 due to the COVID-19 pandemic. Proposed legislation, if passed, would extend this suspension until the end of the pandemic. On January 2, 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several types of providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

These laws, and future state and federal healthcare reform measures may be adopted in the future, any of which may result in additional reductions in Medicare and other healthcare funding and otherwise affect the prices we may obtain for any of our product candidates for which we may obtain regulatory approval or the frequency with which any such product candidate is prescribed or used.

European Union drug marketing and reimbursement regulations may materially affect our ability to market and receive coverage for our products in the European Member States.

We intend to seek approval to market our product candidates in both the U.S. and in selected foreign jurisdictions. If we obtain approval in one or more foreign jurisdictions for our product candidates, we will be subject to rules and regulations in those jurisdictions. In some foreign countries, particularly those in the European Union, the pricing of biologics is subject to governmental control and other market regulations which could put pressure on the pricing and usage of our product candidates. In these countries, pricing negotiations with governmental authorities can take considerable time after obtaining marketing approval of a product candidate. In addition, market acceptance and sales of our product candidates will depend significantly on the availability of adequate coverage and reimbursement from third-party payors for our product candidates and may be affected by existing and future health care reform measures.

Much like the Anti-Kickback Statue prohibition in the U.S., the provision of benefits or advantages to physicians to induce or encourage the prescription, recommendation, endorsement, purchase, supply, order or use of medicinal products is also prohibited in the European Union and the U.K. The provision of benefits or advantages to induce or reward improper performance generally is governed by the national anti-bribery laws of European Union Member States and the U.K. Bribery Act 2010 in the U.K. Infringement of these laws could result in substantial fines and imprisonment. EU Directive 2001/83/EC, which is the EU Directive governing medicinal products for human use, further provides that, where medicinal products are being promoted to persons qualified to prescribe or supply them, no gifts, pecuniary advantages or benefits in kind may be supplied, offered or promised to such persons unless they are inexpensive and relevant to the practice of medicine or pharmacy. This provision has been transposed into the Human Medicines Regulations 2012 and so remains applicable in the U.K. despite its departure from the European Union.

Payments made to physicians in certain European Union Member States must be publicly disclosed. Moreover, agreements with physicians often must be the subject of prior notification and approval by the

physician's employer, his or her competent professional organization and/or the regulatory authorities of the individual European Union Member States. These requirements are provided in the national laws, industry codes or professional codes of conduct, applicable in the European Union Member States. Failure to comply with these requirements could result in reputational risk, public reprimands, administrative penalties, fines or imprisonment.

In addition, in most foreign countries, including those in the European Economic Area, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing and reimbursement vary widely from country to country. For example, the European Union provides options for its Member States to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. Reference pricing used by various European Union Member States and parallel distribution, or arbitrage between low-priced and high-priced Member States, can further reduce prices. A Member State may approve a specific price for the medicinal product, or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. In some countries, we may be required to conduct a clinical trial or other trials that compare the cost-effectiveness of any of our product candidates to other available therapies in order to obtain or maintain reimbursement or pricing approval. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products. An increasing number of countries are taking initiatives to attempt to reduce large budget deficits by focusing cost-cutting efforts on pharmaceuticals for their state-run health care systems. These international price control efforts have impacted all regions of the world, but have been most drastic in the European Union. Historically, products launched in the European Union do not follow price structures of the U.S. and generally prices tend to be significantly lower. Publication of discounts by third-party payors or authorities may lead to further pressure on the prices or reimbursement levels within the country of publication and other countries. If pricing is set at unsatisfactory levels or if reimbursement of our products is unavailable or limited in scope or amount, our revenues from sales by us or our strategic partners and the potential profitability of any of our product candidates in those countries would be negatively affected.

Data collection is governed by restrictive regulations governing the use, processing, and cross-border transfer of personal information.

In the event we decide to conduct clinical trials or continue to enroll subjects in our ongoing or future clinical trials in the European Union, we may be subject to additional privacy restrictions. The collection, use, storage, transfer, and other processing of personal data, including personal health data, regarding individuals in the European Economic Area is governed, as of May 2018, by the General Data Protection Regulation, or GDPR. The GDPR imposes several requirements on companies that process personal data, including requirements relating to the processing of health and other sensitive data, the consent of the individuals to whom the personal data relates, the information provided to the individuals regarding data processing activities, the notification of data processing obligations to the competent national data protection authorities and certain measures to be taken when engaging third-party processors. The GDPR also imposes strict rules on the transfer of personal data out of the European Economic Area, including to the U.S. Failure to comply with the requirements of the GDPR, and the related national data protection laws of the European Union Member States, may result in fines and other administrative penalties , including potential fines of up to €20 million or 4% of annual global revenues, whichever is greater. The GDPR also confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies, and obtain compensation for damages resulting from violations of the GDPR. The GDPR regulations may impose additional responsibility and liability in relation to personal data that we process and we may be required to put in place additional mechanisms ensuring compliance with the new data protection rules, including as implemented by individual countries. This may be onerous and adversely affect our business, financial condition, results of operations and prospects. In addition, further to the U.K.'s exit from the European Union on January 31, 2020, the GDPR ceased to apply in the U.K. at the end of the transition period on December 31, 2020. However, as of January 1, 2021, the U.K.'s European Union (Withdrawal) Act 2018 incorporated the GDPR (as it existed on December 31, 2020 but subject to certain U.K. specific amendments) into U.K. law, which is commonly referred to as the U.K. GDPR. The U.K.

GDPR and the U.K. Data Protection Act 2018 set out the U.K.'s data protection regime, which is independent from but aligned to the European Union's data protection regime. Non-compliance with the U.K. GDPR may result in monetary penalties of up to £17.5 million or 4% of worldwide revenue, whichever is higher. The U.K., however, is now regarded as a third country under the European Union's GDPR which means that transfers of personal data from the EEA to the U.K. will be restricted unless an appropriate safeguard, as recognized by the European Union's GDPR, has been put in place. Although, under the EU-U.K. Trade Cooperation Agreement it is lawful to transfer personal data between the U.K. and the EEA for a 6 month period following the end of the transition period, with a view to achieving an adequacy decision from the European Commission during that period. Like the European Union GDPR, the U.K. GDPR restricts personal data transfers outside the U.K. to countries not regarded by the U.K. as providing adequate protection (this means that personal data transfers from the U.K. to the EEA remain free flowing). Compliance with the GDPR will be a rigorous and time-intensive process that may increase our cost of doing business or require us to change our business practices, and despite those efforts, there is a risk that we may be subject to fines and penalties, litigation, and reputational harm in connection with any future European or U.K. activities.

In the U.S., California recently enacted the California Consumer Privacy Act, or CCPA, which creates new individual privacy rights for California consumers (as defined in the law) and places increased privacy and security obligations on entities handling personal data of consumers or households. The CCPA will require covered companies to provide certain disclosures to consumers about its data collection, use and sharing practices, and to provide affected California residents with ways to opt-out of certain sales or transfers of personal information. The CCPA went into effect on January 1, 2020, and became enforceable by the California Attorney General on July 1, 2020. The CCPA provides for civil penalties for violations, as well as a private right of action for certain data breaches that result in the loss of personal information. This private right of action may increase the likelihood of, and risks associated with, data breach litigation. While there is currently an exception for protected health information that is subject to the Health Insurance Portability and Accountability Act of 1996, or HIPAA, and clinical trial regulations, as currently written, the CCPA may impact our business activities. There continues to be uncertainty surrounding the enforcement and implementation of the CCPA, which exemplifies the vulnerability of our business to the evolving regulatory environment related to personal data and protected health information.

Additionally, a new California ballot initiative, the California Privacy Rights Act, or CPRA, was passed in November 2020. Effective starting on January 1, 2023, the CPRA imposes additional obligations on companies covered by the legislation and will significantly modify the CCPA, including by expanding consumers' rights with respect to certain sensitive personal information. The CPRA also creates a new state agency that will be vested with authority to implement and enforce the CCPA and the CPRA. The effects of the CCPA and the CPRA are potentially significant and may require us to modify our data collection or processing practices and policies and to incur substantial costs and expenses in an effort to comply and increase our potential exposure to regulatory enforcement and/or litigation.

Certain other state laws impose similar privacy obligations and we also anticipate that more states may enact legislation similar to the CCPA, which provides consumers with new privacy rights and increases the privacy and security obligations of entities handling certain personal information of such consumers. The CCPA has prompted a number of proposals for new federal and state-level privacy legislation. Such proposed legislation, if enacted, may add additional complexity, variation in requirements, restrictions and potential legal risk, require additional investment of resources in compliance programs, impact strategies and the availability of previously useful data and could result in increased compliance costs and/or changes in business practices and policies.

Additionally, HIPAA, as amended by the Health Information Technology and Clinical Health Act, or HITECH, and its implementing regulations, imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to "business associates," those independent contractors or agents of covered entities that create, receive, maintain, transmit or obtain protected health information in

connection with providing a service on behalf of a covered entity. HITECH also increased the civil and criminal penalties that may be imposed against covered entities, business associates and possibly other persons, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorney's fees and costs associated with pursuing federal civil actions. In addition, there may be additional federal, state and non-U.S. laws which govern the privacy and security of health and other personal information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

Laws and regulations governing international operations may preclude us from developing, manufacturing and selling certain products outside of the U.S. and require us to develop, implement and maintain costly compliance programs.

If we further expand our operations outside of the U.S., we must dedicate additional resources to comply with numerous laws and regulations in each jurisdiction in which we plan to operate. The Foreign Corrupt Practices Act, or FCPA, prohibits any U.S. individual or business from paying, offering, authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the U.S. to comply with certain accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations.

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

Various laws, regulations and executive orders also restrict the use and dissemination outside of the U.S., or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. If we expand our presence outside of the U.S., it will require us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing, manufacturing, or selling certain products and product candidates outside of the U.S., which could limit our growth potential and increase our development costs.

The failure to comply with laws governing international business practices may result in substantial civil and criminal penalties and suspension or debarment from government contracting. The SEC also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions.

Inadequate funding for the FDA, the SEC and other government agencies, including from government shutdowns, or other disruptions to these agencies' operations, could hinder their ability to hire and retain key leadership and other personnel, prevent new products and services from being developed or commercialized in a timely manner or otherwise prevent those agencies from performing normal business functions on which the operation of our business may rely, which could negatively impact our business.

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel and accept the payment of user fees, and statutory, regulatory and policy changes. Average review times at the agency have fluctuated in recent years as a result. Disruptions at the FDA and other agencies may also slow the time necessary for new product candidates to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. In addition, government funding of the SEC and other government agencies on which our operations may rely, including those that fund research and development activities, is subject to the political process, which is inherently fluid and unpredictable.

Disruptions at the FDA and other agencies may also slow the time necessary for new product candidates to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years the U.S. government has shut down several times and certain regulatory authorities, such as the FDA and the SEC, have had to furlough critical FDA, SEC and other government employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. Further, future government shutdowns could impact our ability to access the public markets and obtain necessary capital in order to properly capitalize and continue our operations.

Separately, in response to the COVID-19 pandemic, on March 10, 2020 the FDA announced its intention to postpone most inspections of foreign manufacturing facilities while local, national and international conditions warrant. On March 18, 2020, the FDA announced its intention to temporarily postpone routine surveillance inspections of domestic manufacturing facilities and provided guidance regarding the conduct of clinical trials which the FDA continues to update. As of June 23, 2020, the FDA noted it was conducting mission critical domestic and foreign inspections to ensure compliance of manufacturing facilities with FDA quality standards. On July 10, 2020, the FDA announced its goal of restarting domestic on-site inspections during the week of July 20, 2020, but such activities will depend on data about the virus' trajectory in a given state and locality and the rules and guidelines that are put in place by state and local governments. The FDA has developed a rating system to assist in determining when and where it is safest to conduct prioritized domestic inspections. Should FDA determine that an inspection is necessary for approval and an inspection cannot be completed during the review cycle due to restrictions on travel, FDA has stated that it generally intends to issue a complete response letter. Further, if there is inadequate information to make a determination on the acceptability of a facility, FDA may defer action on the application until an inspection can be completed. In 2020, several companies announced receipt of complete response letters due to the FDA's inability to complete required inspections for their applications. Regulatory authorities outside the U.S. may adopt similar restrictions or other policy measures in response to the COVID-19 pandemic and may experience delays in their regulatory activities. If a prolonged government shutdown or other disruption occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. Future shutdowns or other disruptions could also affect other government agencies such as the SEC, which may also impact our business by delaying review of our public filings, to the extent such review is necessary, and our ability to access the public markets.

We currently have no marketing and sales organization and have no experience in marketing products. If we are unable to establish marketing and sales capabilities or enter into agreements with third parties to market and sell our product candidates, we may not be able to generate product revenue.

We currently have no sales, marketing or distribution capabilities and have no experience in marketing products. We intend to develop an in-house marketing organization and sales force, which will require significant capital expenditures, management resources and time. We will have to compete with other pharmaceutical and biotechnology companies to recruit, hire, train and retain marketing and sales personnel.

If we are unable or decide not to establish internal sales, marketing and distribution capabilities, we will pursue collaborative arrangements regarding the sales and marketing of our products, however, there can be no assurance that we will be able to establish or maintain such collaborative arrangements, or if we are able to do so, that they will have effective sales forces. Any revenue we receive will depend upon the efforts of such third parties, which may not be successful. We may have little or no control over the marketing and sales efforts of such third parties and our revenue from product sales may be lower than if we had commercialized our product candidates ourselves. We also face competition in our search for third parties to assist us with the sales and marketing efforts of our product candidates.

There can be no assurance that we will be able to develop in-house sales and distribution capabilities or establish or maintain relationships with third-party collaborators to commercialize any product in the U.S. or overseas.

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

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

Our ability to commercialize any medicines successfully also will depend in part on the extent to which reimbursement for these medicines and related treatments will be available from government health administration authorities, private health insurers, and other organizations. Government authorities and third-party payors, such as private health insurers and health maintenance organizations, decide which medications they will pay for and establish reimbursement levels. A primary trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. For example, the Trump administration's budget proposal for fiscal year 2021 includes a $135 billion allowance to support legislative proposals seeking to reduce drug prices, increase competition, lower out-of-pocket drug costs for patients, and increase patient access to lower-cost generic and biosimilar drugs. On March 10, 2020, the Trump administration sent "principles" for drug pricing to Congress, calling for legislation that would, among other things, cap Medicare Part D beneficiary out-of-pocket pharmacy expenses, provide an option to cap Medicare Part D beneficiary monthly out-of-pocket expenses, and place limits on pharmaceutical price increases. The Trump administration also previously released a "Blueprint," or plan, to reduce the cost of drugs. The Trump administration's Blueprint contains certain measures that the Department of Health and Human Services is already working to implement. HHS has solicited feedback on some of these measures and has implemented others under its existing authority. For example, in May 2019, CMS issued a final rule to allow Medicare Advantage Plans the option of using step therapy, a type of prior authorization for Medicare Party B drugs beginning January 1, 2020. This final rule codified CMS's policy change that was effective January 1, 2019. On December 27, 2018, the District Court for the District of Columbia invalidated a reimbursement formula change under the 340B drug pricing program and CMS subsequently altered the fiscal years 2019 and 2018 reimbursement formula on specified covered outpatient drugs. The court ruled this change was not an "adjustment" which was within the Secretary's discretion to make but was instead a fundamental change in the reimbursement calculation. However, most recently, on July 31, 2020, the U.S. Court of Appeals for the District of Columbia Circuit overturned the district court's decision and found that the changes were within the Secretary's authority. On September 14, 2020, the plaintiffs-appellees filed a Petition for Rehearing En Banc (i.e, before the full court), but was denied on October 16, 2020. The 340B drug pricing program imposes ceilings on prices that drug manufacturers can charge for medications sold to certain health care facilities. It is unclear how these developments could affect covered hospitals who might purchase our future products and affect the rates we may charge such facilities for our approved products in the future, if any.

While any proposed measures will require authorization through additional legislation to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. Individual states in the U.S. have also increasingly passed legislation and implemented 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.

At the state level, legislatures have become increasingly aggressive in passing legislation and implementing regulations designed to control pharmaceutical and biological product pricing. Some of these measures include price or patient reimbursement constraints, discounts, restrictions on certain product access, marketing cost disclosure and transparency measures, and, in some cases, measures designed to encourage importation from other countries and bulk purchasing. In addition, regional health care authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and which suppliers will be included in their prescription drug and other health care programs. Also, increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. We cannot be sure that reimbursement will be available for any medicine that we commercialize and, if reimbursement is available, the level of reimbursement. Reimbursement may impact the demand for, or the price of, any product candidate for which we obtain marketing approval. If reimbursement is not available or is available only to limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval.

There may be significant delays in obtaining reimbursement for newly approved medicines, and coverage may be more limited than the purposes for which the medicine is approved by the FDA or similar regulatory authorities outside the U.S. Moreover, eligibility for reimbursement does not imply that any medicine will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale, and distribution. Interim reimbursement levels for new medicines, if applicable, may also not be sufficient to cover our costs and may not be made permanent. Reimbursement rates may vary according to the use of the medicine and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost medicines and may be incorporated into existing payments for other services. Net prices for medicines may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of medicines from countries where they may be sold at lower prices than in the U.S. For example, on October 1, 2020, the FDA published a final rule that allows for the importation of certain prescription drugs from Canada. Under the final rule, States and Indian Tribes, and in certain future circumstances pharmacists and wholesalers, may submit importation program proposals to the FDA for review and authorization. On September 25, 2020, CMS stated drugs imported by states under this rule will not be eligible for federal rebates under Section 1927 of the Social Security Act and manufacturers would not report these drugs for “best price” or average manufacturer price purposes. Since these drugs are not considered covered outpatient drugs, CMS further stated it will not publish a National Average Drug Acquisition Cost for these drugs. Separately, the FDA also issued a final guidance document outlining a pathway for manufacturers to obtain an additional National Drug Code, or NDC, for an FDA-approved drug that was originally intended to be marketed in a foreign country and that was authorized for sale in that foreign country. Lastly, on July 24, 2020 and September 13, 2020, President Trump signed several Executive Orders aimed at lowering drug prices. On July 24, 2020, President Trump signed Executive Orders directing the Secretary of HHS to: (1) eliminate protection under an Anti-Kickback Statute safe harbor for certain retrospective price reductions provided by drug manufacturers to sponsors of Medicare Part D plans or pharmacy benefit managers that are not applied at the point-of-sale; (2) allow the importation of certain drugs from other countries through individual waivers, permit the re-importation of insulin products, and prioritize finalization of the FDA’s December 2019 proposed rule to permit the importation of drugs from Canada; (3) ensure that payment by the Medicare program for certain Medicare Part B drugs is not higher than the payment by other comparable countries (depending on whether pharmaceutical manufacturers agree to other measures); and (4) allow certain low-income individuals receiving insulin and epinephrine purchased by a Federally Qualified Health Center as part of the 340B drug pricing program to purchase those drugs at the discounted price paid by the Federally Qualified Health Center. On September 13, 2020, President Trump signed an Executive Order directing HHS to implement a rulemaking plan to test a payment model, pursuant to which Medicare would pay, for certain high-cost prescription drugs and biological products covered by Medicare Part B, no more than the most-favored-nation price (i.e., the lowest price) after adjustments, for a pharmaceutical product that the drug or biologic manufacturer sells in a member country of the Organization for Economic Cooperation and Development that has a comparable per-capita gross domestic product. In response, on November 20, 2020, HHS issued an Interim Final Rule implementing the Most Favored Nation, or MFN, Model under which Medicare Part B reimbursement

rates will be calculated for certain drugs and biologicals based on the lowest price drug manufacturers receive in Organization for Economic Cooperation and Development countries with a similar gross domestic product per capita. The MFN Model regulations mandate participation by identified Part B providers and will apply in all U.S. states and territories for a seven-year period beginning January 1, 2021, and ending December 31, 2027. The Interim Final Rule has not been finalized and is subject to revision and challenge. In addition, on November 20, 2020, finalized another regulation removing the safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers. The FDA also on October 1, 2020, published a final rule that allows for the importation of certain prescription drugs from Canada as discussed above. It is unclear if, when, and to what extent the Executive Orders may be further implemented. The regulatory and market implications of the Executive Orders are unknown at this time, but legislation, regulations or policies allowing the reimportation of drugs may decrease the price we receive for our products and adversely affect our future revenues and prospects for profitability. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their own reimbursement policies. Our inability to promptly obtain coverage and profitable payment rates from both government-funded and private payors for any approved medicines we may develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize medicines, and our overall financial condition.

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

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

- decreased demand for our products;
- injury to our reputation;
- withdrawal of clinical trial participants and inability to continue clinical trials;
- initiation of investigations by regulators;
- costs to defend the related litigation;
- a diversion of management’s time and our resources;
- substantial monetary awards to 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;
- the inability to commercialize any product candidate; and
- a decline in our share price.

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

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

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

Foreign governments often impose strict price controls on approved products, which may adversely affect our future profitability in those countries, and recent federal legislation and actions by federal, state and local governments may permit reimportation of drugs from foreign countries into the U.S., including foreign countries where the drugs are sold at lower prices than in the U.S., which could adversely affect our future profitability.

Frequently foreign governments impose strict price controls on newly approved therapeutic products. If we obtain regulatory approval to sell products in foreign countries, we may be unable to obtain a price that provides an adequate financial return on our investment. Furthermore, we may face competition in the U.S. for our development candidates and investigational medicines, if approved, from therapies sourced from foreign countries that have placed price controls on pharmaceutical products. In the U.S., the FDA issued a final guidance document outlining a pathway for manufacturers to obtain an additional National Drug Code, for an FDA-approved drug that was originally intended to be marketed in a foreign country and that was authorized for sale in that foreign country. The market implications of the final guidance is unknown at this time. Proponents of drug reimportation may attempt to pass legislation that would directly allow reimportation under certain circumstances. Legislation or regulations allowing the reimportation of drugs, if enacted, could decrease the price we receive for any products that we may develop and adversely affect our future revenues and prospects for profitability.

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

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

Accordingly, assuming we, or any collaborators we may have, receive marketing approval for one or more product candidates we develop, we, and such collaborators, and our and their contract manufacturers will continue to expend time, money, and effort in all areas of regulatory compliance, including manufacturing, production, product surveillance, and quality control. If we and such collaborators are not able to comply with post-approval regulatory requirements, we and such collaborators could have the marketing approvals for our products withdrawn by regulatory authorities and our, or such collaborators', ability to market any future products could be limited, which could adversely affect our ability to achieve or sustain profitability. Further, the cost of compliance with post-approval regulations may have a negative effect on our business, operating results, financial condition, and prospects.

Risks Related to Intellectual Property

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

In April 2017, we entered into a license agreement with Novartis pursuant to which we were granted a worldwide license to certain intellectual property rights owned or controlled by Novartis, including patents, patent applications, proprietary information, know-how and other intellectual property, to develop, commercialize and sell one or more therapeutic products comprising MGTA-456 in the field of non-gene-edited/-modified HSCs. In addition, in November 2016, we entered into a license agreement with Harvard University, or Harvard, pursuant to which we were granted a worldwide license to research, develop and commercialize one or more therapeutic products under certain conditioning- and mobilization-related patents and patent applications owned or controlled by Harvard. Furthermore, in March 2018, we entered into a research, development option and license agreement with Heidelberg Pharma Research GmbH, or Heidelberg Pharma, pursuant to which we intend to combine our proprietary antibodies and Heidelberg Pharma's amanitin conjugates platform. We are dependent on the patents, know-how and proprietary technology, licensed from Novartis and Harvard. Furthermore, if we commercialize any products utilizing Heidelberg Pharma's amanitin conjugates platform, we will be dependent on the intellectual property rights we license from Heidelberg Pharma. Any termination of these licenses, or a finding that such intellectual property lacks legal effect, could result in the loss of significant rights and could harm our ability to commercialize our current or future product candidates.

Certain of our license agreements, including our agreements with Novartis, Harvard and Heidelberg Pharma, require us to use diligent efforts or meet development thresholds, to maintain the license, including establishing a set timeline for developing and commercializing products. If we fail to comply with the obligations under our license agreements, including payment terms and diligence terms, our licensors may have the right to terminate our agreements, in which event we may not be able to develop, manufacture, market or sell the products covered by our agreements or may face other penalties under our agreements. Such an occurrence could

materially adversely affect the value of the product candidate being developed under any such agreement. Termination of our license agreements or reduction or elimination of our rights under them may result in our having to negotiate a new or reinstated agreement, which may not be available to us on equally favorable terms, or at all, which may mean we are unable to develop or commercialize the affected product candidate or cause us to lose our rights under the agreement. In addition, with respect to our license agreement with Novartis, Novartis has granted an exclusive license to Intellia Therapeutics, Inc., or Intellia, in the field of gene-modified HSCs under the same intellectual property that Novartis licensed to us. Accordingly, such rights are unavailable to us and in prosecuting, maintaining, enforcing and defending the licensed patents, Novartis may make decisions that may not be in our best interest. Moreover, if Novartis or Intellia take any action with respect to the licensed patents that results in a successful challenge to the licensed patents by any third party, such patents may be invalidated or held to be unenforceable and we may lose our rights under such patents, which would harm our business.

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

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

The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement. If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, or are insufficient to provide us the necessary rights to use the intellectual property, we may be unable to successfully develop and commercialize the affected product candidates. If we or any such licensors fail to adequately protect this intellectual property, our ability to commercialize our products could suffer. Any disputes with our licensors or any termination of the licenses on which we depend could have a material adverse effect on our business, financial condition, results of operations and prospects.

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

Our commercial success depends in large part on our ability to obtain, maintain and protect intellectual property protection through patents, trademarks, and trade secrets in the U.S. and other countries with respect to

our proprietary product candidates. If we do not adequately protect our intellectual property rights, competitors may be able to erode, negate or preempt any competitive advantage we may have, which could harm our business and ability to achieve profitability.

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

In some instances, agreements through which we license patent rights may not give us control over patent prosecution or maintenance, so that we may not be able to control which claims or arguments are presented, how claims are amended, and may not be able to secure, maintain, or successfully enforce necessary or desirable patent protection from those patent rights. We have not had and do not have primary control over patent prosecution and maintenance for certain of the patents and patent applications we license, including under our agreement with Novartis, and therefore cannot guarantee that these patents and applications will be prosecuted or maintained in a manner consistent with the best interests of our business. We cannot be certain that patent prosecution and maintenance activities by our licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents. Moreover, some of our in-licensed patents and patent applications are, and our future owned and licensed patents may be, co-owned with third parties. If we are unable to obtain an exclusive license to any such third-party co-owners' interest in such patents or patent applications, such co-owners may be able to license their rights to other third parties, including our competitors, and our competitors could market competing products and technology. In addition, we may need the cooperation of any such co-owners of our patents in order to enforce such patents against third parties, and such cooperation may not be provided to us.

If the scope of the patent protection we or our licensors obtain is not sufficiently broad, we may not be able to prevent others from developing and commercializing technology and products similar or identical to ours. The degree of patent protection we require to successfully compete in the marketplace may be unavailable or severely limited in some cases and may not adequately protect our rights or permit us to gain or keep any competitive advantage. We cannot provide any assurances that any of our licensed patents have, or that any of our pending owned or licensed patent applications that mature into issued patents will include, claims with a scope sufficient to protect our product candidates or otherwise provide any competitive advantage, nor can we assure you that our licenses will remain in force. Other parties have developed or may develop technologies that may be related or competitive with our approach, and may have filed or may file patent applications and may have been issued or may be issued patents with claims that overlap or conflict with our patent applications, either by claiming the same compounds, formulations or methods or by claiming subject matter that could dominate our patent position. In addition, the laws of foreign countries may not protect our rights to the same extent as the laws of the U.S. Furthermore, patents have a limited lifespan. In the U.S., the natural expiration of a patent is generally twenty years after it is filed. Various extensions may be available; however, the life of a patent, and the protection it affords, is limited. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our patent portfolio may not provide us with adequate and continuing patent protection sufficient to exclude others from commercializing products similar to our product candidates. In addition, the patent portfolio licensed to us is, or may be, licensed to third parties, such as outside our field, and such third parties may have certain enforcement rights. Thus, our owned and licensed patents and any patents we

own or license in the future could be put at risk of being invalidated or interpreted narrowly in litigation filed by or against another licensee or in administrative proceedings brought by or against another licensee in response to such litigation or for other reasons.

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

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

We, or any future partners, collaborators, or licensees, may fail to identify patentable aspects of inventions made in the course of development and commercialization activities before it is too late to obtain patent protection on them. Therefore, we may miss potential opportunities to strengthen our patent position.

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

The patent position of biotechnology and pharmaceutical companies carries uncertainty. In addition, the determination of patent rights with respect to pharmaceutical compounds commonly involves complex legal and factual questions, which are dependent upon the current legal and intellectual property context, extant legal precedent and interpretations of the law by individuals. As a result, the issuance, scope, validity, enforceability and commercial value of our patent rights are characterized by uncertainty.

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

Moreover, because the issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, our owned and licensed patents or pending patent applications may be challenged in the courts or patent offices in the U.S. and abroad. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found. If such prior art exists, it may be used to invalidate a patent, or may prevent a patent from issuing from a pending patent application. For example, such patent filings may be subject to a third-party submission of prior art to the U.S. Patent and Trademark Office, or USPTO, or to other patent offices around the world. Alternately or additionally, we may become involved in post-grant review procedures, oppositions, derivation proceedings, *ex parte* reexaminations, *inter partes* review, supplemental examinations, or interference proceedings or challenges in district court, in the U.S. or in various foreign patent offices, including both national and regional, challenging patents or patent applications in which we have rights, including patents on which we rely to protect our business. An adverse determination in any such challenges may result in loss of the patent or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, or in denial of the patent application or loss or reduction in the scope of one or more claims of the patent application, any of which could limit our ability to stop others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products. In addition, given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized.

Pending and future patent applications may not result in patents being issued that protect our business, in whole or in part, or which effectively prevent others from commercializing competitive products. Competitors may also be able to design around our patents. Changes in either the patent laws or interpretation of the patent laws in the U.S. and other countries may diminish the value of our patents or narrow the scope of our patent protection. In addition, the laws of foreign countries may not protect our rights to the same extent or in the same manner as the laws of the U.S. For example, patent laws in various jurisdictions, including significant commercial markets such as Europe, restrict the patentability of methods of treatment of the human body more than U.S. law does. Any of these outcomes could have a material adverse effect on our ability to generate revenue.

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

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

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

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

In addition to the protection afforded by patents, we rely upon trade secret protection, know-how and continuing technological innovation to develop and maintain our competitive position. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our contractors, collaborators, scientific advisors, employees and consultants and invention assignment agreements with our consultants and employees. However, we may not obtain these agreements in all circumstances, and individuals with whom we have these agreements may not comply with their terms. The assignment of intellectual property rights under these agreements may not be self-executing or the assignment agreements may be breached, and we may be forced to bring claims against third parties, or defend claims that they may bring against us, to determine the ownership of what we regard as our intellectual property. In addition, we may not be able to prevent the unauthorized disclosure or use of our technical know-how or other trade secrets by the parties to these agreements despite the existence of confidentiality agreements and other contractual restrictions. Monitoring unauthorized uses and disclosures is difficult and we do not know whether the steps we have taken to protect our proprietary technologies will be effective. If any of the contractors, collaborators, scientific advisors, employees and consultants who are parties to these agreements breaches or violates the terms of any of these agreements, we may not have adequate remedies for any such breach or violation. As a result, we could lose our trade secrets. Enforcing a claim against a third party that illegally obtained and is using our trade secrets, like patent litigation, is expensive and time-consuming and the outcome is unpredictable. In addition, courts outside the U.S. are sometimes less willing or unwilling to protect trade secrets.

Moreover, our trade secrets could otherwise become known or be independently discovered by our competitors or other third parties. Competitors and other third parties could purchase our product candidates and attempt to replicate some or all of the competitive advantages we derive from our development efforts, willfully infringe our intellectual property rights, design around our protected technology or develop their own competitive technologies that fall outside of our intellectual property rights. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor or other third party, we would have no right to prevent them, or those to whom they communicate it, from using that technology or information to compete with us. If our trade secrets are not adequately protected or sufficient to provide an advantage over our competitors, our competitive position could be adversely affected, as could our business. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating our trade secrets.

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

Our commercial success depends in part on our avoiding infringement, misappropriation and other violations of the patents and proprietary rights of third parties. There is a substantial amount of litigation involving patents and other intellectual property rights in the biotechnology and pharmaceutical industries, as well as administrative proceedings for challenging patents, including interference and reexamination proceedings before the USPTO or oppositions and other comparable proceedings in foreign jurisdictions. Recently, under U.S. patent reform, new procedures including *inter partes* review and post grant review have been implemented. As stated above, this reform will bring uncertainty to the possibility of challenge to our patents in the future. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing our product candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may give rise to claims of infringement of the patent rights of others.

Third parties may assert that we are employing their proprietary technology without authorization. For example, we are aware of certain patent applications owned by a third party with claims that if issued in their present form could be construed to cover MGTA-117. If such patent claims are issued, the third party may seek to allege that our development and commercialization of MGTA-117 infringes such patents and file a patent infringement lawsuit against us in the future. While we believe we would have valid defenses against any such allegation or lawsuit, such defenses may be unsuccessful. In this regard, patents issued in the U.S. by law enjoy a presumption of validity that can be rebutted only with evidence that is "clear and convincing," a heightened standard of proof. There may also be third-party patents of which we are currently unaware with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our product candidates may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. If any third-party patents were held by a court of competent jurisdiction to cover the manufacturing process of our product candidates, constructs or molecules used in or formed during the manufacturing process, or any final product itself, the holders of any such patents may be able to block our ability to commercialize the product candidate unless we obtained a license under the applicable patents, or until such patents expire or they are finally determined to be held invalid or unenforceable. Similarly, if any third-party patent were held by a court of competent jurisdiction to cover aspects of our formulations, processes for manufacture or methods of use, including combination therapy or patient selection methods, the holders of any such patent may be able to block our ability to develop and commercialize the product candidate unless we obtained a license or until such patent expires or is finally determined to be held invalid or unenforceable. In either case, such a license may not be available on commercially reasonable terms or at all. Even if we obtained such a license, it may only be non-exclusive, which would permit third parties to use the same intellectual property and compete with us. If we are unable to obtain a necessary license to a third-party patent on commercially reasonable terms, or at all, we may be unable to commercialize our product candidates or such efforts may be impaired or delayed, which could in turn significantly harm our business.

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

In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, obtain one or more licenses from third

parties, pay royalties or redesign our infringing products, which may be impossible or require substantial time and monetary expenditure. We cannot predict whether any such license would be available at all or whether it would be available on commercially reasonable terms. Furthermore, even in the absence of litigation, we may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we would be unable to further develop and commercialize our product candidates, which could harm our business significantly. Any of the foregoing may have a material adverse effect on our business, financial condition, results of operations and prospects.

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

Periodic maintenance fees on any issued patent are due to be paid to the USPTO and foreign patent agencies in several stages over the lifetime of the patent. The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Noncompliance events that could result in abandonment or lapse of a patent or patent application include, but are not limited to, failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. In such an event, our competitors might be able to enter the market earlier than would otherwise have been the case, which would have a material adverse effect on our business.

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

Many of the intellectual property rights we have licensed are generated through the use of U.S. government funding and are therefore subject to certain federal regulations. As a result, the U.S. government may have certain rights to intellectual property embodied in our current or future product candidates pursuant to the Bayh-Dole Act of 1980, or Bayh-Dole Act. These U.S. government rights in certain inventions developed under a government-funded program include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose. In addition, the U.S. government has the right to require us to grant exclusive, partially exclusive, or non-exclusive licenses to any of these inventions to a third party if it determines that: (1) adequate steps have not been taken to commercialize the invention; (2) government action is necessary to meet public health or safety needs; or (3) government action is necessary to meet requirements for public use under federal regulations (also referred to as "march-in rights"). The U.S. government also has the right to take title to these inventions if we, or the applicable licensor, fail to disclose the invention to the government and fail to file an application to register the intellectual property within specified time limits. Intellectual property generated under a government funded program is also subject to certain reporting requirements, compliance with which may require us or the applicable licensor to expend substantial resources. In addition, the U.S. government requires that any products embodying the subject invention or produced through the use of the subject invention be manufactured substantially in the U.S. The manufacturing preference requirement can be waived if the owner of the intellectual property can show that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the U.S. or that under the circumstances domestic manufacture is not commercially feasible. This preference for U.S. manufacturers may limit our ability to contract with non-U.S. product manufacturers for products covered by such intellectual property. To the extent any of our current or future intellectual property is generated through the use of U.S. government funding, the provisions of the Bayh-Dole Act may similarly apply.

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

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

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

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

As is the case with other biopharmaceutical companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biopharmaceutical industry involve both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain. In addition, the U.S. has recently enacted and is currently implementing wide-ranging patent reform legislation. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. For example, in the case, *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, the U.S. Supreme Court held that certain claims to DNA molecules are not patentable. In addition, the case *Amgen Inc. v. Sanofi* affects the way antibody claims are examined and litigated. We cannot predict how future decisions by the courts, the Congress or the USPTO may impact the value of our patents.

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

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

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

Many countries have compulsory licensing laws under which a patent owner may be compelled under specified circumstances to grant licenses to third parties. In addition, many countries limit the enforceability of patents against government agencies or government contractors. In those countries, we may have limited remedies if patents are infringed or if we are compelled to grant a license to a third party, which could materially diminish the value of those patents. This could limit our potential revenue opportunities. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license, which could adversely affect our business, financial condition, results of operations, and prospects.

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

Patents have a limited lifespan. In the U.S., if all maintenance fees are timely paid, the natural expiration of a patent is generally 20 years from its earliest filing date of a non-provisional application to which the patent claims priority. Various extensions may be available, but the life of a patent, and the protection it affords, is limited. Even if patents covering our product candidates are obtained, once the patent life has expired for a product candidate, we may be open to competition from competitive medications, including generic medications. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such product candidates might expire before or shortly after such product candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing product candidates similar or identical to ours.

Depending upon the timing, duration and conditions of any FDA marketing approval of our product candidates, one or more of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, referred to as the Hatch-Waxman Amendments, and similar legislation in the European Union. The Hatch-Waxman Amendments permit a patent term extension of up to five years for a patent covering an approved product as compensation for effective patent term lost during product development and the FDA regulatory review process. However, we may not receive an extension if we fail to exercise due diligence during the testing phase or regulatory review process, fail to apply within applicable deadlines, fail to apply prior to expiration of relevant patents or otherwise fail to satisfy applicable requirements.

Moreover, the length of the extension could be less than we request. Only one patent per approved product can be extended, the extension cannot extend the total patent term beyond 14 years from approval and only those claims covering the approved drug, a method for using it, or a method for manufacturing it may be extended. If we are unable to obtain patent term extension or the term of any such extension is less than we request, the period during which we can enforce our patent rights for the applicable product candidate will be shortened and our competitors may obtain approval to market competing products sooner. As a result, our revenue from applicable products could be reduced. Further, if this occurs, our competitors may take advantage of our investment in development and trials by referencing our clinical and preclinical data and launch their product earlier than might otherwise be the case, and our competitive position, business, financial condition, results of operations, and prospects could be materially harmed.

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

We employ individuals who were previously employed at universities or other biopharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees and consultants do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed intellectual property, including trade secrets or other proprietary information, of a former employer or other third parties. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

Intellectual property rights do not necessarily address all potential threats.

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

- others may be able to make products that are similar to any product candidates we may develop or utilize similar technology but that are not covered by the claims of the patents that we license or own;
- we, or our current or future licensors might not have been the first to make the inventions covered by the issued patent or pending patent application that we license or own;
- we, or our current or future licensors might not have been the first to file patent applications covering certain of our or their inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our owned or licensed intellectual property rights;
- it is possible that our pending owned or licensed patent applications or those that we may own or license in the future will not lead to issued patents;
- issued patents that we hold rights to may be held invalid or unenforceable, including as a result of legal challenges by our competitors;
- our competitors might conduct research and development activities in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we may not develop additional proprietary technologies that are patentable;
- the patents of others may harm our business; and
- we may choose not to file a patent in order to maintain certain trade secrets or know-how, and a third party may subsequently file a patent covering such intellectual property.

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

Risks Related to Our Dependence on Third Parties

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

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

Collaborations involving our research programs or any product candidates we may develop, pose certain risks to us, including the below.

- Collaborators have significant discretion in determining the efforts and resources that they will apply to these collaborations.
- Collaborators may not pursue development and commercialization of any product candidates we may develop or may elect not to continue or renew development or commercialization programs based on clinical trial results, changes in the collaborator's strategic focus or available funding or external factors such as an acquisition that diverts resources or creates competing priorities.
- Collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials, or require a new formulation of a product candidate for clinical testing.
- Collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our medicines or product candidates if the collaborators believe that competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours.
- Collaborators with marketing and distribution rights to one or more medicines may not commit sufficient resources to the marketing and distribution of such medicine or medicines.
- Collaborators may not properly obtain, maintain, enforce, or defend our intellectual property or proprietary rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our proprietary information or expose us to potential litigation.
- Disputes may arise between the collaborators and us that result in the delay or termination of the research, development, or commercialization of our medicines or product candidates or that result in costly litigation or arbitration that diverts management attention and resources.
- We may lose certain valuable rights under circumstances identified in our collaborations, including if we undergo a change of control.
- Collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable product candidates.

- Collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner or at all. If a present or future collaborator of ours were to be involved in a business combination, the continued pursuit and emphasis on our product development or commercialization program under such collaboration could be delayed, diminished, or terminated.

If our collaborations do not result in the successful development and commercialization of products, or if one of our collaborators terminates its agreement with us, we may not receive any future research funding or milestone or royalty payments under the collaboration. If we do not receive the funding we expect under these agreements, our development of product candidates could be delayed, and we may need additional resources to develop product candidates. In addition, if one of our collaborators terminates its agreement with us, we may find it more difficult to find a suitable replacement collaborator or attract new collaborators, and our development programs may be delayed or the perception of us in the business and financial communities could be adversely affected. All of the risks relating to product development, regulatory approval, and commercialization described in this Annual Report on Form 10-K apply to the activities of our collaborators.

We have in the past and may in the future decide to collaborate with pharmaceutical and biotechnology companies for the development and potential commercialization of any product candidates we may develop. These relationships, or those like them, may require us to incur non-recurring and other charges, increase our near- and long-term expenditures, issue securities that dilute our existing stockholders, or disrupt our management and business. In addition, we could face significant competition in seeking appropriate collaborators, and the negotiation process is time-consuming and complex. Our ability to reach a definitive collaboration agreement will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration, and the proposed collaborator's evaluation of several factors. If we license rights to any product candidates we or our collaborators may develop, we may not be able to realize the benefit of such transactions if we are unable to successfully integrate them with our existing operations and company culture.

We are developing E478 specifically to partner with gene therapy and genome editing companies. If we are unable to find willing collaborators, this may adversely affect the development of E478 and our business.

We are developing E478 specifically to partner and collaborate with gene therapy and genome editing companies. In particular, we seek to selectively pursue collaboration arrangements with companies that have particular technology, expertise or resources for the development of E478, if approved. However, we may not be able to execute on such collaboration and any collaboration that we may enter into may not be successful. If we are unable to identify partners whose capabilities complement and integrate well with ours and reach collaboration arrangements with such partners on a timely basis, on acceptable terms or at all, or if the arrangements we establish are unproductive for us, we may fail to meet our business and development objectives for E478, which may adversely affect our business.

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

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

We face significant competition in seeking appropriate collaborators. Whether we reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration, and the proposed collaborator's evaluation of a number of factors. Those factors may include the design or results of clinical trials, the likelihood of approval by the FDA or similar regulatory authorities outside the U.S., the potential market for the subject

product candidate, the costs and complexities of manufacturing and delivering such product candidate to patients, the potential of competing products, the existence of uncertainty with respect to our ownership of technology, which can exist if there is a challenge to such ownership without regard to the merits of the challenge, and industry and market conditions generally. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available to collaborate on and whether such a collaboration could be more attractive than the one with us.

Collaborations are complex and time-consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators.

If any party to which we have outsourced certain functions fails to perform its obligations under agreements with us, the development and commercialization of our product candidates and any future product candidates could be delayed or terminated.

To the extent that we rely on third party individuals or other companies to manage the day-to-day conduct of our clinical trials or to manufacture, sell or market our current product candidates or any future product candidates, we will be dependent on the timeliness and effectiveness of their efforts. If a clinical research management organization that we might utilize is unable to allocate sufficient qualified personnel to our trials or if the work performed by it does not fully satisfy the rigorous requirements of the FDA, we may encounter substantial delays and increased costs in completing our clinical trials. If a firm producing humanized forms of our molecular antibody product candidates or a manufacturer of the raw material or finished product for our clinical trials is unable to meet our time schedules or cost parameters, the timing of our clinical trials and development of our product candidates may be adversely affected. Any manufacturer that we select may encounter difficulties in scaling-up the manufacture of new products in commercial quantities, including problems involving product yields, product stability or shelf life, quality control, adequacy of control procedures and policies, compliance with FDA regulations and the need for further FDA approval of any new manufacturing processes and facilities. The manufacture of clinical supplies for trials and commercial quantities of our current product candidates and any future product candidates are likely to be inherently more difficult and costly than typical chemical pharmaceuticals. This could delay commercialization of any of our product candidates, if approved, or reduce the profitability of these candidates for us. If any of these occur, the development and commercialization of our product candidates could be delayed, curtailed or terminated because we may not have sufficient financial resources or capabilities to continue such development and commercialization on our own.

We expect to continue to rely on third parties to manufacture our clinical product supplies, and we intend to rely on third parties to produce and process our product candidates, if approved.

We do not currently own any facility that may be used as our clinical-scale manufacturing and processing facility and must eventually rely on outside vendors to manufacture supplies and process our product candidates. We have not yet caused any product candidates to be manufactured or processed on a commercial scale and may not be able to do so for any of our product candidates. We will make changes as we work to optimize the manufacturing process, and we cannot be sure that even minor changes in the process will result in therapies that are safe and effective.

The facilities used by our contract manufacturers to manufacture our product candidates must be approved by the FDA or other foreign regulatory agencies pursuant to inspections that will be conducted after we submit an application to the FDA or other foreign regulatory agencies. We do not control the manufacturing process of, and will be completely dependent on, our contract manufacturing partners for compliance with regulatory requirements, known as cGMP requirements for manufacture of our product candidates. If our contract manufacturers cannot successfully manufacture material that conforms to our specifications and the strict regulatory requirements of the FDA or other regulatory authorities, they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities. In addition, we have no control over the ability of

our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel. If the FDA or a comparable foreign regulatory authority does not approve these facilities for the manufacture of our product candidates or if it withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for or market our product candidates, if approved.

If any CMO with whom we contract fails to perform its obligations, we may be forced to manufacture the materials ourselves, for which we may not have the capabilities or resources, or enter into an agreement with a different CMO, which we may not be able to do on reasonable terms, if at all. In addition, should any of our agreements with our contract manufacturers terminate, in particular the agreements with the University of Minnesota and Heidelberg Pharma, they may be difficult to replace if we were no longer able to rely on them. In these scenarios, our clinical trials supply could be delayed significantly as we establish alternative supply sources. In some cases, the technical skills required to manufacture our products or product candidates may be unique or proprietary to the original CMO and we may have difficulty, or there may be contractual restrictions prohibiting us from, transferring such skills to a back-up or alternative supplier, or we may be unable to transfer such skills at all. In addition, if we are required to change CMOs for any reason, we will be required to verify that the new CMO maintains facilities and procedures that comply with quality standards and with all applicable regulations. We will also need to verify, such as through a manufacturing comparability study, that any new manufacturing process will produce our product candidate according to the specifications previously submitted to the FDA or another regulatory authority. The delays associated with the verification of a new CMO could negatively affect our ability to develop product candidates or commercialize our products in a timely manner or within budget. Furthermore, a CMO may possess technology related to the manufacture of our product candidate that such CMO owns independently. This would increase our reliance on such CMO or require us to obtain a license from such CMO in order to have another CMO manufacture our product candidates. In addition, changes in manufacturers often involve changes in manufacturing procedures and processes, which could require that we conduct bridging studies between our prior clinical supply used in our clinical trials and that of any new manufacture. We may be unsuccessful in demonstrating the comparability of clinical supplies which could require the conduct of additional clinical trials.

Risks Related to Employee Matters, Managing Growth and Other Risks Related to Our Business

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

As of December 31, 2020, we had 69 full-time employees. As our development, manufacturing and commercialization plans and strategies develop, and as we continue to operate as a public company, we expect to need and are actively recruiting additional managerial, operational, sales, marketing, financial and other personnel. Future growth would impose significant added responsibilities on members of management, including:

- identifying, recruiting, integrating, maintaining and motivating additional employees;
- managing our internal development efforts effectively, including the clinical, FDA and international regulatory review process for our product candidates, while complying with our contractual obligations to contractors and other third parties; and
- improving our operational, financial and management controls, reporting systems and procedures.

Our future financial performance and our ability to develop, manufacture and commercialize our product candidates will depend, in part, on our ability to effectively manage any future growth, and our management may also have to divert financial and other resources, and a disproportionate amount of their attention away from day-to-day activities in order to devote a substantial amount of time, to managing these growth activities.

We currently rely, and for the foreseeable future will continue to rely, in substantial part on certain independent organizations, advisors and consultants to provide certain services, including substantially all aspects of regulatory approval, clinical management and manufacturing. We cannot assure you that the services of independent organizations, advisors and consultants will continue to be available to us on a timely basis when needed, or that we can find qualified replacements. In addition, if we are unable to effectively manage our outsourced activities or if the quality or accuracy of the services provided by consultants is compromised for any reason, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval of our product candidates or otherwise advance our business. We cannot assure you that we will be able to manage our existing consultants or find other competent outside contractors and consultants on economically reasonable terms, or at all.

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

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

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

The increasing use of social media platforms presents new risks and challenges.

Social media is increasingly being used to communicate about our clinical development programs and the diseases our therapeutics are being developed to treat, and we intend to utilize appropriate social media in connection with our commercialization efforts following approval of our product candidates, if any. Social media practices in the biopharmaceutical industry continue to evolve and regulations and regulatory guidance relating to such use are evolving and not always clear. This evolution creates uncertainty and risk of noncompliance with regulations applicable to our business, resulting in potential regulatory actions against us, along with the potential for litigation related to off-label marketing or other prohibited activities. For example, patients may use social media channels to comment on their experience in an ongoing blinded clinical trial or to report an alleged adverse event. When such disclosures occur, there is a risk that trial enrollment may be adversely impacted, we fail to monitor and comply with applicable adverse event reporting obligations or that we may not be able to defend our business or the public's legitimate interests in the face of the political and market pressures generated by social media due to restrictions on what we may say about our product candidates. There is also a risk of inappropriate disclosure of sensitive information or negative or inaccurate posts or comments about us on any social networking website. If any of these events were to occur or we otherwise fail to comply with applicable regulations, we could incur liability, face regulatory actions or incur other harm to our business.

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

As of December 31, 2020, we had net operating loss carryforwards for federal income tax purposes of $182.3 million, of which $17.5 million begin to expire in 2035 and $164.8 million can be carried forward indefinitely. As of December 31, 2020, we had net operating loss carryforwards for state income tax purposes of

$184.6 million which begin to expire in 2035. As of December 31, 2020, we also had available research and orphan drug tax credit carryforwards for federal and state income tax purposes of $8.4 million and $2.0 million, respectively, which begin to expire in 2035 and 2030, respectively. These net operating loss carryforwards and research and orphan drug tax credit carryforwards could expire unused and be unavailable to offset future income tax liabilities. In addition, in general, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an "ownership change" is subject to limitations on its ability to utilize its pre-change net operating losses or tax credits to offset future taxable income or taxes. For these purposes, an ownership change generally occurs where the aggregate stock ownership of one or more stockholders or groups of stockholders who owns at least 5% of a corporation's stock increases its ownership by more than 50 percentage points over its lowest ownership percentage within a specified testing period. Utilization of our net operating loss carryforwards and research and orphan drug tax credit carryforwards may be subject to a substantial annual limitation under Section 382 and 383 of the Code due to ownership changes that have occurred previously or that could occur in the future. These ownership changes may limit the amount of carryforwards that can be utilized annually to offset future taxable income. The Company has not conducted a formal study to assess whether a change of control has occurred or whether there have been multiple changes of control since inception due to the significant complexity and cost associated with such a study. If an ownership change has occurred or does occur in the future, the amount of net operating loss and tax credit carryforwards presented in our financial statements could be limited or expire unutilized.

We may not be successful in finding strategic collaborators for continuing development of certain of our product candidates or successfully commercializing or competing in the market for certain indications.

Because we have limited financial and managerial resources, we focus on research programs and product candidates that we identify for specific indications. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to timely capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. and industry and market conditions generally. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available to collaborate on and whether such a collaboration could be more attractive than the one with us for our product candidate. The terms of any additional collaborations or other arrangements that we may establish may not be favorable to us.

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

We may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of the product candidate for which we are seeking to collaborate, reduce or delay its development program or one or more of our other development programs, delay its potential commercialization or reduce the scope of any sales or marketing activities, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to further develop our product candidates or bring them to market and generate product revenue.

In addition, any collaborations that we enter into may not be successful. The success of our collaboration arrangements will depend heavily on the efforts and activities of our collaborators. Collaborators generally have significant discretion in determining the efforts and resources that they will apply to these collaborations. Disagreements between parties to a collaboration arrangement regarding clinical development and commercialization matters can lead to delays in the development process or commercializing the applicable product candidate and, in some cases, termination of the collaboration arrangement. These disagreements can be difficult to resolve if neither of the parties has final decision-making authority. Collaborations with pharmaceutical or biotechnology companies and other third parties often are terminated or allowed to expire by the other party. Any such termination or expiration would adversely affect us financially and could harm our business reputation.

We face significant competition from other biotechnology and pharmaceutical companies, and our operating results will suffer if we fail to compete effectively.

The biopharmaceutical industry is characterized by intense competition and rapid innovation. Our competitors may be able to develop other compounds or drugs that are able to achieve similar or better results. Our potential competitors include major multinational pharmaceutical companies, established biotechnology companies, specialty pharmaceutical companies and universities and other research institutions. Many of our competitors have substantially greater financial, technical and other resources, such as larger research and development staff and experienced marketing and manufacturing organizations and well-established sales forces. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large, established companies. Mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated in our competitors. 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. Our competitors, either alone or with collaborative partners, may succeed in developing, acquiring or licensing on an exclusive basis drug or biologic products that are more effective, safer, more easily commercialized or less costly than our product candidates or may develop proprietary technologies or secure patent protection that we may need for the development of our technologies and products. We believe the key competitive factors that will affect the development and commercial success of our product candidates are efficacy, safety, tolerability, reliability, convenience of use, price and reimbursement.

Our competitors include companies focused on developing technologies to improve the distinct steps of stem cell transplant.

In addition, we anticipate competing with the largest pharmaceutical companies in the world, which have greater financial and human resources than we currently have. For additional information regarding our competition, see “Item 1. Business – Competition” in our Annual Report on Form 10-K.

Even if we obtain regulatory approval of our product candidates, the availability and price of our competitors’ products could limit the demand and the price we are able to charge for our product candidates. We may not be able to implement our business plan if the acceptance of our product candidates is inhibited by price competition or the reluctance of physicians to switch from existing methods of treatment to our product candidates, or if physicians switch to other new drug or biologic products or choose to reserve our product candidates for use in limited circumstances.

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

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste products. We generally contract with third

parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials, which could cause an interruption of our commercialization efforts, research and development efforts and business operations, environmental damage resulting in costly clean-up and liabilities under applicable laws and regulations governing the use, storage, handling and disposal of these materials and specified waste products. Although we believe that the safety procedures utilized by our third-party manufacturers for handling and disposing of these materials generally comply with the standards prescribed by these laws and regulations, we cannot guarantee that this is the case or eliminate the risk of accidental contamination or injury from these materials. In such an event, we may be held liable for any resulting damages and such liability could exceed our resources and state or federal or other applicable authorities may curtail our use of certain materials and/or interrupt our business operations. Furthermore, environmental laws and regulations are complex, change frequently and have tended to become more stringent. We cannot predict the impact of such changes and cannot be certain of our future compliance. In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions. We do not currently carry biological or hazardous waste insurance coverage.

Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials or other work-related injuries, this insurance may not provide adequate coverage against potential liabilities.

We may not be successful in our efforts to identify additional product candidates. Due to our limited resources and access to capital, we must prioritize development of certain product candidates; these decisions may prove to be wrong and may adversely affect our business.

Although we intend to explore other therapeutic opportunities, in addition to the product candidates that we are currently developing, we may fail to identify successful product candidates for clinical development for a number of reasons. If we fail to identify additional potential product candidates, our business could be materially harmed.

Research programs to pursue the development of our planned product candidates for additional indications and to identify new product candidates and disease targets require substantial technical, financial and human resources whether or not they are ultimately successful. Our research programs may initially show promise in identifying potential indications and/or product candidates, yet fail to yield results for clinical development for a number of reasons, including:

- the research methodology used may not be successful in identifying potential indications and/or product candidates;
- potential product candidates may, after further study, be shown to have harmful adverse effects or other characteristics that indicate they are unlikely to be effective drugs; or
- it may take greater human and financial resources than we will possess to identify additional therapeutic opportunities for our product candidates or to develop suitable potential product candidates through internal research programs, thereby limiting our ability to develop, diversify and expand our product portfolio.

Because we have limited financial and human resources, we intend to initially focus on research programs and product candidates for a limited set of indications. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential or a greater likelihood of success. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities.

Accordingly, there can be no assurance that we will ever be able to identify additional therapeutic opportunities for our product candidates or to develop suitable potential product candidates through internal research programs, which could materially adversely affect our future growth and prospects. We may focus our efforts and resources on potential product candidates or other potential programs that ultimately prove to be unsuccessful.

Risks Related to Our Common Stock

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

In June 2018, we closed our IPO. Prior to our IPO, there was no public market for our common stock. Although we have completed our IPO and shares of our common stock are listed and trading on the Nasdaq Global Market, an active trading market for our shares may not be sustained. If an active market for our common stock does not continue, it may be difficult for our stockholders to sell their shares without depressing the market price for the shares or sell their shares at or above the prices at which they acquired their shares or sell their shares at the time they would like to sell. Any inactive trading market for our common stock may also impair our ability to raise capital to continue to fund our operations by selling shares and may impair our ability to acquire other companies or technologies by using our shares as consideration.

The trading price of our common stock has been, and will likely continue to be, highly volatile. Securities class action or other litigation involving our company or members of our management team could also substantially harm our business, financial condition and results of operations.

The trading price of our common stock may be highly volatile. The stock market in general, and the market for smaller pharmaceutical and biotechnology companies in particular, have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, you may not be able to sell your common stock at or above the purchase price and you may lose some or all of your investment. The market price for our common stock may be influenced by many factors, including:

- the success of existing or new competitive products or technologies;
- regulatory actions with respect to our product candidates or our competitors' products and product candidates;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations or capital commitments;
- the timing and results of preclinical studies for any of our product candidates;
- the timing and results of clinical trials of MGTA-145 and any other product candidates;
- commencement or termination of collaborations for E478 or any of our current and future programs and product candidates;
- failure or discontinuation of any of our development programs;
- results of clinical trials of product candidates of our competitors;
- regulatory or legal developments in the U.S. and other countries;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- the level of expenses related to any of our product candidates or clinical development programs;
- the results of our efforts to develop additional product candidates or products;

- actual or anticipated changes in estimates as to financial results or development timelines;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us, our insiders or other stockholders;
- variations in our financial results or those of companies that are perceived to be similar to us;
- changes in estimates or recommendations by securities analysts, if any, that cover us;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors;
- disruptions to political, governmental or regulatory systems, including shutdowns of the government and its agencies;
- general economic, industry and market conditions; and
- the other factors described in this "Risk Factors" section.

In the past, securities class action litigation has often been brought against a company following a decline in the market price of its securities. This risk is especially relevant for biopharmaceutical companies, which have experienced significant stock price volatility in recent years.

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

We are an emerging growth company, as defined in the JOBS Act. For as long as we continue to be an emerging growth company, we may take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including not being required to comply with the auditor attestation requirements of 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 nonbinding advisory votes on executive compensation and stockholder approval of any golden parachute payments not previously approved. We could be an emerging growth company for up to five years following the year in which we completed our IPO, although circumstances could cause us to lose that status earlier. We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year (a) following the fifth anniversary of the closing of our IPO, (b) in which we have total annual gross revenue of at least $1.07 billion or (c) in which we are deemed to be a large accelerated filer, which requires the market value of our common stock that is held by non-affiliates to exceed $700 million as of the prior June 30th, and (2) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period.

Even after we no longer qualify as an emerging growth company, we may still qualify as a "smaller reporting company" which would allow us to take advantage of many of the same exemptions from disclosure requirements including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act and reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements. We cannot predict if investors will find our common stock less attractive because we may rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

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. Under the JOBS Act, emerging growth companies 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. We have elected not to "opt out" of such

extended transition period, which means that when a standard is issued or revised and it has different application dates for public or private companies, we will adopt the new or revised standard at the time private companies adopt the new or revised standard and will do so until such time that we either (1) irrevocably elect to "opt out" of such extended transition period or (2) no longer qualify as an emerging growth company.

We do not anticipate paying any cash dividends on our capital stock in the foreseeable future. Accordingly, stockholders must rely on capital appreciation, if any, for any return on their investment.

We have never declared nor paid cash dividends on our capital stock. We currently plan to retain all of our future earnings, if any, to finance the operation, development and growth of our business. In addition, the terms of any future debt or credit agreements may preclude us from paying dividends. As a result, capital appreciation, if any, of our common stock will be the sole source of gain for our stockholders for the foreseeable future.

Concentration of ownership of our common stock among our existing executive officers, directors and principal stockholders may prevent new investors from influencing significant corporate decisions.

Our executive officers, directors and principal stockholders, together with their respective affiliates, beneficially owned approximately 62% of our capital stock as of December 31, 2020. This concentration of ownership control could delay, defer or prevent a change in control, entrench our management or the board of directors, or impede a merger, consolidation, takeover or other business combination involving us that other stockholders may desire.

Provisions in our corporate charter documents and under Delaware law may prevent or frustrate attempts by our stockholders to change our management or hinder efforts to acquire a controlling interest in us.

Provisions in our corporate charter and our bylaws may discourage, delay or prevent a merger, acquisition or other change in control of us that stockholders may consider favorable, including transactions in which our stockholders might otherwise receive a premium for their shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions:

- establish a classified board of directors such that all members of the board are not elected at one time;
- allow the authorized number of our directors to be changed only by resolution of our board of directors;
- limit the manner in which stockholders can remove directors from the board;
- establish advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted on at stockholder meetings;
- require that stockholder actions must be effected at a duly called stockholder meeting and prohibit actions by our stockholders by written consent;
- limit who may call a special meeting of stockholders;
- authorize our board of directors to issue preferred stock without stockholder approval, which could be used to institute a "poison pill" that would work to dilute the stock ownership of a potential hostile acquirer, effectively preventing acquisitions that have not been approved by our board of directors; and
- require the approval of the holders of at least 66.67% of the votes that all our stockholders would be entitled to cast to amend or repeal certain provisions of our charter or bylaws.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which prohibits a person who owns 15% or more of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired 15% or more of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner. This could discourage, delay or prevent someone from acquiring us or merging with us, whether or not it is desired by, or beneficial to, our stockholders. This could also have the effect of discouraging others from making tender offers for our common stock, including transactions that may be in the best interest of our stockholders. These provisions may also prevent changes in our management or limit the price that investors are willing to pay for our stock.

Our amended and restated bylaws provide that, unless we consent in writing to the selection of an alternative forum, certain designated courts will be the sole and exclusive forum for certain legal actions 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, employees or agents.

Pursuant to our amended and restated bylaws, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for state law claims for (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim of or based on a breach of a fiduciary duty owed by any of our current or former directors, officers or other employees to us or our stockholders, (3) any action asserting a claim against us or any of our current or former directors, officers, employees or stockholders arising pursuant to any provision of the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws or (4) any action asserting a claim governed by the internal affairs doctrine, which we refer to herein as the "Delaware Forum Provision." The Delaware Forum Provision will not apply to any causes of action arising under the Securities Act of 1933, as amended, or the Securities Act, and the Securities Exchange Act of 1934, as amended. Our amended and restated bylaws further provide that the U.S. District Court for the District of Massachusetts will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act, which we refer to herein as the "Federal Forum Provision." We have chosen the U.S. District Court for the District of Massachusetts as the exclusive forum for such Securities Act causes of action because our principal executive offices are located in Cambridge, Massachusetts. In addition, our amended and restated bylaws provide that any person or entity purchasing or otherwise acquiring any interest in any shares of our common stock is deemed to have notice of and consented to the foregoing Delaware Forum Provision and the Federal Forum Provision.

On December 19, 2018, Court of Chancery of the State of Delaware issued a decision in *Sciabacucchi v. Salzberg*, C.A. No. 2017-0931-JTL (Del. Ch.) declaring that federal forum selection provisions purporting to require claims under the Securities Act be brought in federal court are ineffective and invalid under Delaware law. However, that decision was appealed to the Delaware Supreme Court and on March 18, 2020, the Delaware Supreme Court reversed the Court of Chancery and ruled that such federal forum selection provisions are "facially valid" under Delaware law. In light of the Delaware Supreme Court's ruling, we intend to enforce the Federal Forum Provision designating the District of Massachusetts as the exclusive forum for Securities Act causes of action.

We recognize that the Delaware Forum Provision and the Federal Forum Provision may impose additional litigation costs on stockholders in pursuing any such claims, particularly if the stockholders do not reside in or near the State of Delaware or the Commonwealth of Massachusetts, as applicable. Additionally, the forum selection clauses in our amended and restated bylaws may limit our stockholders' ability to bring a claim in a judicial forum that they find favorable for disputes with us or our directors, officers or employees, which may discourage such lawsuits against us and our directors, officers and employees even though an action, if successful, might benefit our stockholders. The Federal Forum Provision may also impose additional litigation costs on stockholders who assert the provision is not enforceable or invalid. The Court of Chancery of the State of Delaware or the U.S. District Court for the District of Massachusetts, as applicable, may also reach different judgments or results than would other courts, including courts where a stockholder considering an action may be located or would otherwise choose to bring the action, and such judgments may be more or less favorable to us than our stockholders.

General Risk Factors

Changes in tax law could adversely affect our business and financial condition.

The rules dealing with U.S. federal, state, and local income taxation are constantly under review by persons involved in the legislative process and by the Internal Revenue Service and the Treasury Department. Changes to tax laws (which changes may have retroactive application) could adversely affect us or holders of our common stock. In recent years, many such changes have been made and changes are likely to continue to occur in the future. Future changes in tax laws could have a material adverse effect on our business, cash flow, financial condition or results of operations. We urge investors to consult with their legal and tax advisers regarding changes in tax laws on an investment in our common stock.

If we lose key management personnel, or if we fail to recruit additional highly skilled personnel, our ability to identify and develop new or next generation product candidates will be impaired, which could result in loss of market opportunities or market share and could make us less competitive.

Our ability to compete in the highly competitive biotechnology and pharmaceutical industries depends upon our ability to attract and retain highly qualified managerial, scientific and medical personnel. We are highly dependent on our management, particularly our Chief Executive Officer, the members of our executive team, and key scientific and medical personnel employees. The loss of the services of any of our executive officers, key employees, and scientific and medical advisors, and our inability to find suitable replacements, could result in delays in product development and harm our business.

We conduct our operations at our facility in Cambridge, Massachusetts. This region is headquarters to many other biopharmaceutical companies and many academic and research institutions. Competition for skilled personnel in our market is intense and may limit our ability to hire and retain highly qualified personnel on acceptable terms or at all.

To induce valuable employees to remain at our company, in addition to salary and cash incentives, we have provided stock options that vest over time. The value to employees of stock options that vest over time may be significantly affected by movements in our stock price that are beyond our control, and may at any time be insufficient to counteract more lucrative offers from other companies. Despite our efforts to retain valuable employees, members of our management, scientific and development teams may terminate their employment with us on short notice. Although we have employment agreements with our key employees, these agreements provide for at-will employment, which means that any of our employees could leave our employment at any time, with or without notice. We do not maintain “key man” insurance policies on the lives of these individuals or the lives of any of our other employees. Our success also depends on our ability to continue to attract, retain and motivate highly skilled junior, mid-level and senior managers as well as junior, mid-level and senior scientific and medical personnel.

If we fail to maintain an effective system of internal control over financial reporting, we may not be able to accurately report our financial results or prevent fraud. As a result, stockholders could lose confidence in our financial and other public reporting, which would harm our business and the trading price of our common stock.

Effective internal controls over financial reporting are necessary for us to provide reliable financial reports and, together with adequate disclosure controls and procedures, are designed to prevent fraud. Any failure to implement required new or improved controls, or difficulties encountered in their implementation could cause us to fail to meet our reporting obligations. In addition, any testing by us conducted in connection with Section 404 of the Sarbanes-Oxley Act of 2002, as amended, or the Sarbanes-Oxley Act, or any subsequent testing by our independent registered public accounting firm, may reveal deficiencies in our internal controls over financial reporting that are deemed to be material weaknesses or that may require prospective or retroactive changes to our

financial statements or identify other areas for further attention or improvement. Inferior internal controls could also cause investors to lose confidence in our reported financial information, which could have a negative effect on the trading price of our stock.

We are required to disclose changes made in our internal controls and procedures on a quarterly basis and our management will be required to assess the effectiveness of these controls annually. However, for as long as we are an "emerging growth company" under the Jumpstart Our Business Startups Act, or the JOBS Act, enacted in April 2012, our independent registered public accounting firm will not be required to attest to the effectiveness of our internal controls over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act. We could be an "emerging growth company" for up to five years. An independent assessment of the effectiveness of our internal controls over financial reporting could detect problems that our management's assessment might not. Undetected material weaknesses in our internal controls over financial reporting could lead to financial statement restatements and require us to incur the expense of remediation.

Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and stock price.

As has been widely reported, global credit and financial markets have experienced extreme volatility and disruptions in the past several years, including severely diminished liquidity and credit availability, declines in consumer confidence, declines in economic growth and uncertainty about economic stability. There can be no assurance that further deterioration in credit and financial markets and confidence in economic conditions will not occur. Our general business strategy may be adversely affected by any such economic downturn, volatile business environment or continued unpredictable and unstable market conditions. If the current equity and credit markets deteriorate, or do not improve, it may make any necessary debt or equity financing more difficult, more costly, and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance and stock price and could require us to delay or abandon clinical development plans. In addition, there is a risk that one or more of our current service providers, manufacturers and other partners may not survive these difficult economic times, which could directly affect our ability to attain our operating goals on schedule and on budget.

At December 31, 2020, we had $148.8 million of cash, cash equivalents and marketable securities. While we are not aware of any downgrades, material losses, or other significant deterioration in the fair value of our cash equivalents or marketable securities since December 31, 2020, no assurance can be given that further deterioration of the global credit and financial markets would not negatively impact our current portfolio of cash equivalents or our ability to meet our financing objectives. Furthermore, our stock price may decline due in part to the volatility of the stock market and the general economic downturn.

Business disruptions could seriously harm our future revenue and financial condition and increase our costs and expenses.

Our operations, and those of our CMOs, our CROs and other contractors and consultants, could be subject to earthquakes, power shortages, telecommunications failures, water shortages, floods, hurricanes, typhoons, fires, extreme weather conditions, medical epidemics and other natural or man-made disasters or business interruptions, for which we are predominantly self-insured. The occurrence of any of these business disruptions could seriously harm our operations and financial condition and increase our costs and expenses. Our ability to obtain clinical supplies of our product candidates could be disrupted if the operations of these suppliers are affected by a man-made or natural disaster or other business interruption.

Our internal computer systems, or those used by our CMOs, CROs or other contractors or consultants, may fail or suffer security breaches.

Despite the implementation of security measures, our internal computer systems and those of our future CMOs, future CROs and other contractors and consultants are vulnerable to damage from computer viruses and unauthorized access. If such a system failure or security breach were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations. For example, the loss of clinical trial data from completed or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. Likewise, we may rely on third parties for the manufacture of our product candidates and to conduct clinical trials, and similar events relating to their computer systems could also have a material adverse effect on our business. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability, including potential lawsuits from patients, collaborators, employees and/or stockholders, and the further development and commercialization of our product candidates could be delayed.

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

We are exposed to the risk of employee fraud or other illegal activity by our employees, independent contractors, consultants, commercial partners and vendors. Misconduct by these parties could include intentional, reckless and/or negligent conduct that fails to comply with the laws of the FDA and other similar foreign regulatory bodies, provide true, complete and accurate information to the FDA and other similar foreign regulatory bodies, comply with manufacturing standards we have established, comply with healthcare fraud and abuse laws in the U.S. and similar foreign fraudulent misconduct laws, or report financial information or data accurately or to disclose unauthorized activities to us. If we obtain FDA approval of any of our product candidates and begin commercializing those products in the U.S., our potential exposure under such laws will increase significantly, and our costs associated with compliance with such laws are also likely to increase. These laws may impact, among other things, our current activities with principal investigators and research patients, as well as proposed and future sales, marketing and education programs.

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

Healthcare providers, physicians and third-party payors in the U.S. and elsewhere play a primary role in the recommendation and prescription of pharmaceutical products. Arrangements with third-party payors and customers can expose pharmaceutical manufacturers to broadly applicable fraud and abuse and other healthcare laws and regulations, including, without limitation, the federal Anti-Kickback Statute, the False Claims Act, laws and regulations related to the reporting of payments to physicians and teaching hospitals, and HIPAA, which may constrain the business or financial arrangements and relationships through which such companies sell, market and distribute pharmaceutical products. In particular, the promotion, sales and marketing of healthcare items and services, as well as certain business arrangements in the healthcare industry, are subject to extensive laws designed to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, structuring and commission(s), certain customer incentive programs and other business arrangements generally. Activities subject to these laws also involve the improper use of information obtained in the course of patient recruitment for clinical trials. The applicable federal, state and foreign healthcare laws and regulations laws that may affect our ability to operate include, but are not limited to the below.

- The federal Anti-Kickback Statute, which prohibits, among other things, knowingly and willfully soliciting, receiving, offering, paying or providing any remuneration (including any kickback, bribe, or

rebate), directly or indirectly, in cash or in kind, to induce, or in return for, either the referral of an individual, 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 a federal healthcare program, such as the Medicare and Medicaid programs. A person or entity can be found guilty of violating the statute without actual knowledge of the statute or specific intent to violate it. In addition, a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act. The Anti-Kickback Statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers, and formulary managers on the other. There are a number of statutory exceptions and regulatory safe harbors protecting some common activities from prosecution.

- Federal civil and criminal false claims laws and civil monetary penalty laws, including the False Claims Act, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, false or fraudulent claims for payment to, or approval by Medicare, Medicaid, or other federal healthcare programs, knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim or an obligation to pay or transmit money to the federal government, or knowingly concealing or knowingly and improperly avoiding or decreasing an obligation to pay money to the federal government. Manufacturers can be held liable under the 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. The False Claims Act also permits a private individual acting as a "whistleblower" to bring actions on behalf of the federal government alleging violations of the False Claims Act and to share in any monetary recovery.
- HIPAA, which created new federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or obtain, by means of false or fraudulent pretenses, representations, or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, regardless of the payor (e.g., public or private) and knowingly and willfully falsifying, concealing or covering up by any trick or device a material fact or making any materially false statements in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters. Similar to the federal Anti-Kickback Statute, a person or entity can be found guilty of violating HIPAA without actual knowledge of the statute or specific intent to violate it.
- HIPAA, as amended by HITECH, and their respective implementing regulations, which impose, among other things, requirements on certain covered healthcare providers, health plans, and healthcare clearinghouses as well as their respective business associates that perform services for them that involve the use, or disclosure of, individually identifiable health information, relating to the privacy, security and transmission of individually identifiable health information without appropriate authorization. HITECH also created new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions.
- The federal Physician Payment Sunshine Act of 2010, as amended by the Health Care and Education Reconciliation Act, which require manufacturers of drugs, devices, biologicals and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to CMS information related to any payments and other transfers of value made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. Effective January 1, 2022, these reporting obligations will extend to include transfers of value made to certain non-physician providers such as physician assistants and nurse practitioners.
- Additional federal consumer protection and unfair competition laws, which broadly regulate marketplace activities and activities that potentially harm consumers.

Additionally, we are subject to state and foreign equivalents of each of the healthcare laws described above, among others, some of which may be broader in scope and may apply regardless of the payor. For instance, state anti-kickback and false claims laws may apply to items or services reimbursed by any third-party payor, including commercial insurers or patients. Laws related to insurance fraud may provide claims involving private insurers. State laws may require pharmaceutical or medical device companies to comply with the industry's voluntary compliance guidelines and the applicable compliance guidance promulgated by the federal government or otherwise restrict payments that may be made to healthcare providers and other potential referral sources. State and local laws may also require the licensure of sales representatives, and require drug or device manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures and pricing information. Further data privacy and security laws and regulations in foreign jurisdictions that may be more stringent than those in the U.S. (such as the European Union, which adopted the GDPR, which became effective in May 2018). Analogous state laws may additionally govern the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect.

Pricing and rebate programs must comply with the Medicaid rebate requirements of the U.S. Omnibus Budget Reconciliation Act of 1990 and more recent requirements in the ACA. If products are made available to authorized users of the Federal Supply Schedule of the General Services Administration, additional laws and requirements apply. Products must meet applicable child- resistant packaging requirements under the U.S. Poison Prevention Packaging Act. Manufacturing, sales, promotion and other activities also are potentially subject to federal and state consumer protection and unfair competition laws.

The distribution of pharmaceutical products is subject to additional requirements and regulations, including extensive record-keeping, licensing, storage and security requirements intended to prevent the unauthorized sale of pharmaceutical products.

The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies often scrutinize interactions between healthcare companies and healthcare providers, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Ensuring business arrangements comply with applicable healthcare laws, as well as responding to possible investigations by government authorities, can be time- and resource-consuming and can divert a company's attention from the business.

The failure to comply with any of these laws or regulatory requirements subjects entities to possible legal or regulatory action. Depending on the circumstances, failure to meet applicable regulatory requirements can result in civil, criminal and administrative penalties, damages, fines, disgorgement, individual imprisonment, possible exclusion from participation in federal and state funded healthcare programs, contractual damages and the curtailment or restricting of our operations, as well as additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws. Any action for violation of these laws, even if successfully defended, could cause a pharmaceutical manufacturer to incur significant legal expenses and divert management's attention from the operation of the business. Prohibitions or restrictions on sales or withdrawal of future marketed products could materially affect business in an adverse way. In connection with our IPO, we adopted a code of business conduct and ethics, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent inappropriate conduct may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. Efforts to ensure that our business arrangements will comply with applicable healthcare laws may involve substantial costs. It is possible that governmental and enforcement authorities will conclude that our business practices may not comply with current or future statutes, regulations, guidance or case law interpreting applicable fraud and abuse or other healthcare laws and regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those

actions could have a significant impact on our business, including the imposition of civil, criminal and administrative penalties, damages, disgorgement, monetary fines, imprisonment, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of noncompliance with these laws, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations, any of which could adversely affect our ability to operate our business and our results of operations. In addition, the approval and commercialization of any of our product candidates outside the U.S. will also likely subject us to foreign equivalents of the healthcare laws mentioned above, among other foreign laws.

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

As a public company, and particularly after we are no longer an "emerging growth company," we will incur significant legal, accounting and other expenses that we did not incur as a private company, including costs associated with public company reporting requirements. We also anticipate that we will incur costs associated with relatively recently adopted corporate governance requirements, including requirements of the SEC, and the Nasdaq Global Market. We expect these rules and regulations to increase our legal and financial compliance costs and to make some activities more time-consuming and costly. We also expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. As a result, it may be more difficult for us to attract and retain qualified individuals to serve on our board of directors or as executive officers.

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

Pursuant to Section 404 of the Sarbanes-Oxley Act, or Section 404, we are required to furnish a report by our management on our internal control over financial reporting. However, while we remain an emerging growth company, we will not be required to include an attestation report on internal control over financial reporting issued by our independent registered public accounting firm. We conduct a process each year to document and evaluate our internal control over financial reporting, which is both costly and challenging. In this regard, we dedicate internal resources, engage outside consultants and adopt a detailed work plan to assess and document the adequacy of internal control over financial reporting, continue steps to improve control processes as appropriate, validate through testing that controls are functioning as documented and implement a continuous reporting and improvement process for internal control over financial reporting. Despite our efforts, there is a risk that we will not be able to conclude that our internal control over financial reporting is effective as required by Section 404. If we identify one or more material weaknesses, it could result in an adverse reaction in the financial markets due to a loss of confidence in the reliability of our financial statements.

We have broad discretion over the use of our cash and investments and may not use them effectively.

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

If securities or industry analysts do not publish research or publish inaccurate or unfavorable research about our business, our share price and trading volume could decline.

The trading market for our common stock may be influenced, in part, by the research and reports that industry or securities analysts publish about us or our business. We do not currently have and may never obtain research coverage by securities and industry analysts. If no or few securities or industry analysts commence coverage of us, or one or more of the analysts who cover us issues an adverse opinion about our company, our stock price would likely decline. If one or more of these analysts ceases research coverage of us or fails to regularly publish reports on us, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our headquarters are located at 100 Technology Square, Cambridge, Massachusetts, where we occupy approximately 69,000 square feet of research and development, laboratory and office space. This lease expires in February 2028. We have subleased approximately 27,000 square feet of office space at our headquarters to two third parties. The subleases expire in the third quarter of 2021 and second quarter of 2022. We believe that our office and laboratory space is sufficient to meet our needs for the foreseeable future and that suitable additional space will be available as and when needed.

ITEM 3. LEGAL PROCEEDINGS

From time to time, we may be subject to legal proceedings and claims in the ordinary course of business. We are not currently aware of any such proceedings or claims that we believe will have, individually or in the aggregate, a material adverse effect on our business, financial condition or results of operations.

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

Certain Information Regarding the Trading of Our Common Stock

Our common stock trades under the symbol "MGTA" on the Nasdaq Global Market and has been publicly traded since June 21, 2018. Prior to this time, there was no public market for our common stock.

Holders of Our Common Stock

As of January 31, 2021, there was approximately one holder of record of shares of our common stock. The actual number of holders of our common stock 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 or held by other nominees.

Securities Authorized for Issuance Under Equity Compensation Plans

The information required by Item 5 of Form 10-K regarding equity compensation plans is incorporated herein by reference to Item 12 of Part III of this Annual Report.

Recent Sales of Unregistered Securities

None.

Use of Proceeds from Initial Public Offering

On June 25, 2018, we completed the initial public offering of our common stock pursuant to which we issued and sold 6,666,667 shares of our common stock at a price to the public of $15.00 per share.

All of the shares issued and sold in the initial public offering were registered under the Securities Act pursuant to a Registration Statement on Form S-1 (File No. 333-225178), which was declared effective by the SEC on June 20, 2018. Following the sale of the shares in connection with the closing of our initial public offering, the offering terminated. Goldman Sachs & Co. LLC, J.P. Morgan Securities LLC and Cowen & Co. acted as joint book-running managers and Wedbush PacGrow acted as lead manager of our initial public offering.

We received aggregate gross proceeds from our initial public offering of approximately $100.0 million, or aggregate net proceeds of approximately $89.9 million after deducting underwriting discounts and commissions and offering expenses. None of the underwriting discounts and commissions or offering expenses were incurred or paid to directors or officers of ours or their associates or to persons owning 10 percent or more of our common stock or to any of our affiliates.

We have not used any of the net proceeds from the offering to make payments, directly or indirectly, to any director or officer of ours, or any of their associates, to any person owning 10 percent or more of our common stock or to any affiliate of ours. We have invested the remaining net proceeds from the offering in money market accounts. There has been no material change in our planned use of the net proceeds from the offering as described in our final prospectus filed pursuant to Rule 424(b)(4) under the Securities Act with the SEC on June 21, 2018.

Issuer Purchases of Equity Securities by the Issuer and Affiliated Purchasers

Period	(a) Total Number of Shares (or Units) Purchased	(b) Average Price Paid per Share (or Unit)	(c) Total Number of Shares (or Units) Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number or Approximate Dollar Value of Shares (or Units) that May Yet be Purchased Under the Plans or Programs
October 1, 2020 - October 31, 2020	305	$ 0.03	N/A	N/A
November 1, 2020 - November 30, 2020	—	—	N/A	N/A
December 1, 2020 - December 31, 2020	647	$ 0.03	N/A	N/A
Total	952(1)	$ 0.03		

(1) Represents shares of restricted common stock of Magenta Therapeutics, Inc. repurchased in connection with the termination of certain employees' employment with Magenta Therapeutics, Inc. Under the terms of the applicable restricted stock award agreements, such shares were repurchased by Magenta Therapeutics, Inc. at the amount originally paid by such employees for such shares.

ITEM 6. SELECTED FINANCIAL DATA

We are a smaller reporting company, as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, for this reporting period and are not required to provide the information required under this item.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

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

Overview

Magenta Therapeutics is a clinical-stage biotechnology company developing novel medicines to bring the curative power of stem cell transplants to more patients with blood cancers, genetic diseases and autoimmune diseases.

Magenta's drug development pipeline includes multiple product candidates designed to improve stem cell transplants. Our lead clinical program is designed to more efficiently and reliably mobilize and collect sufficient functional stem cells for use in stem cell transplantation, a process known as mobilization. We are also developing product candidates that are designed to deplete targeted cells in the bone marrow to make space for the bone marrow to receive newly transplanted stem cells, a process known as conditioning. Our mobilization program is intended to enable rapid, reliable, predictable and safe mobilization and collection of high numbers of functional stem cells for transplant. Magenta's targeted conditioning programs are intended to enhance the efficacy of and/or reduce the dosing levels, intensity or, in some cases, even the need for chemotoxic agents.

Stem cell transplant is an established and, for certain patients, can be a curative medical procedure that can reset a patient's blood and immune system after the patient has received treatment for certain blood cancers, genetic diseases or autoimmune diseases. Stem cell transplants involve a three-step process: (i) stem cells are mobilized out of the patient's or donor's bone marrow and collected from the blood (or, in rare cases, surgically extracted from their bone marrow); (ii) the patient's bone marrow is cleared of any remaining stem cells in order to make space to receive new transplanted stem cells; and (iii) the stem cells are transplanted into the patient via infusion where they fasten to, or engraft in, the bone marrow and grow into the blood cells and platelets that form the basis of a reset and rebuilt blood and immune system. All transplants are categorized as either autologous or allogeneic depending on the source of the new stem cells for the transplant. In an autologous transplant, the patient's own stem cells are used. In an allogeneic transplant, patients receive cells from a stem cell donor.

Stem cell transplant, whether autologous or allogeneic, has broad applicability across disease settings, including blood cancers, gene therapies for genetic diseases and autoimmune diseases. It is the current standard of care for certain blood cancers such as acute myeloid leukemia, or AML, myelodysplastic syndromes, or MDS, multiple myeloma and non-Hodgkin's lymphoma. Hematopoietic stem cell, or HSC, -based gene therapies also rely on the same steps of the stem cell transplant process with an additional step where collected stem cells are gene-corrected or modified to address the underlying disease prior to transplant. Such gene therapy approaches that leverage the stem cell transplant procedure are being investigated by numerous companies in a variety of diseases, including sickle cell disease, beta-thalassemia and lysosomal storage disorders. Autoimmune diseases such as multiple sclerosis and systemic sclerosis may also benefit from resetting the immune system through stem cell transplant.

Currently, the number of days required to mobilize and collect a patient's or donor's stem cells is a minimum of five days in blood cancer patients and healthy donors and as many as 30 days or more in patients with sickle cell disease. When planning for a patient's transplant, transplanting physicians cannot reliably predict

at the outset how long it will take for patients to mobilize the number of cells required. Many patients require multiple collections, including approximately 40% of blood cancer patients and 75% of sickle cell disease patients. In addition, each day scheduled for attempted mobilization and collection can cause an accumulation of both the direct costs associated with the repeated use of mobilization agents and other healthcare resources, including personnel time, and the indirect costs associated with the need to block time in the limited number of chairs in transplant centers that are used to collect stem cells. Similarly, HSC-based gene therapies could benefit from more efficient collection of stem cells which could potentially reduce gene therapy manufacturing timelines and costs. Additionally, there are no approved mobilization options for patients with sickle cell disease and autoimmune diseases, and the off-label use of currently available medicines is associated with significant safety risks including vaso-occlusive events in sickle cell disease patients.

Magenta is developing MGTA-145 for stem cell mobilization in a broad range of diseases, for both autologous and allogeneic transplants. MGTA-145 is Magenta's biologic stem cell mobilization product candidate designed to address these time and cost inefficiencies while enabling the rapid, reliable, predictable and safe collection of functional blood stem cells for transplant in a single day. In 2020, we completed a Phase 1 clinical trial in healthy volunteers to evaluate the ability of MGTA-145, in combination with plerixafor, to mobilize stem cells. Based on the results of the study, we have advanced the program into three ongoing and planned Phase 2 clinical trials, including an autologous transplant trial in multiple myeloma patients; an allogeneic transplant trial with healthy donor cells collected for transplant in patients with acute myeloid leukemia, myelodysplastic syndromes or acute lymphocytic leukemia, or ALL; and lastly, a planned trial in partnership with bluebird bio, Inc. to mobilize and collect the stem cells of sickle cell disease patients.

In addition to the opportunity to address the challenges in mobilization and collection of stem cells, Magenta also seeks to improve patient conditioning prior to transplant. Conditioning is the process by which patients are treated with chemotherapy prior to transplant to ensure that the bone marrow has sufficient space to receive newly transplanted stem cells. Currently, only approximately 50% of eligible patients receive a stem cell transplant, in part because of the risks and toxicities of the chemotherapeutic agents available today. Magenta's lead conditioning program, MGTA-117, is designed to selectively deplete stem cells and reduce the need for high-dose or high-intensity chemotherapeutic agents in oncology applications and potentially eliminate the use of busulfan in gene therapy applications. Our additional research-stage conditioning programs target stem and/or immune cells and are being designed to eliminate toxic chemotherapy conditioning regimens across multiple disease settings. Our C100 program focuses on addressing opportunities in immune reset for autoimmune diseases. Our C300 program is being designed to provide for lymphodepletion prior to cell therapies such as chimeric antigen receptor T cells, or CAR-T. Our G100 program is being designed to provide prophylaxis of graft-versus-host disease, a common post-transplant complication following allogeneic stem cell transplant.

Magenta is also evaluating two programs with potential in cell therapy. Each is a small molecule used to manufacture a high number of functional stem cells, from either a donor or gene-modified stem cells from a patient. MGTA-456 is a cell therapy designed to generate higher cell doses that are well matched to the patient, which has been shown to improve the speed and success of engraftment in stem cell transplant and improve disease outcomes. In June 2020, we announced that we discontinued enrollment in our Phase 2 trial of MGTA-456 in inherited metabolic diseases. Enrollment in an investigator-initiated trial in patients with blood cancers has been completed, and we plan to use these data, when available, to inform a decision regarding future program development in blood cancers. Our second cell therapy program, E478, is a small molecule aryl hydrocarbon receptor, or AHR, antagonist which uses the same mechanism used to manufacture MGTA-456 to expand gene-modified HSCs for stem cell-based gene therapy and genome editing.

Magenta intends to become a fully integrated discovery, development and commercial company in the field of stem cell transplant. We are developing our product candidates to be used individually or, in some cases, in combination with each other. As a result, our portfolio could be tailored to the patient's disease, such that a patient may receive more than one Magenta therapy as part of his or her individual stem cell transplant.

We are experiencing operational and other challenges as a result of the novel coronavirus, or COVID-19, global pandemic, which could delay or halt the development of our product candidates. See "—Recent Developments" and "Item 1A. Risk Factors" for further discussion of the current and expected impact on our business and product candidates.

Since our inception in 2015, we have focused substantially all of our efforts and financial resources on organizing and staffing our company, business planning, raising capital, acquiring and developing our technology, identifying potential product candidates, and undertaking preclinical studies, and in the case of MGTA-145 and MGTA-456, clinical trials. We do not have any products approved for sale and have not generated any revenue from product sales.

In June 2018, we completed an initial public offering of our common stock. In May 2019, we issued and sold 4,887,500 shares of our common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $13.25 per share, resulting in net proceeds of $60.3 million after underwriting discounts and commissions and other offering expenses. In June 2020, we issued and sold 8,625,000 shares of our common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $8.00 per share, resulting in net proceeds of $64.6 million after underwriting discounts and commissions and other offering expenses.

Since our inception, we have incurred significant operating losses. Our ability to generate product revenue sufficient to achieve profitability will depend heavily on the successful development and eventual commercialization of one or more of our product candidates. Our net loss was $74.9 million and $76.8 million for the years ended December 31, 2020 and 2019, respectively. As of December 31, 2020, we had an accumulated deficit of $254.4 million. We expect to continue to incur significant expenses and increasing operating losses for at least the next several years. We expect our expenses and capital requirements will increase in connection with our ongoing activities, particularly as we:

- initiate, enroll and conduct new Phase 2 clinical trials for MGTA-145;
- initiate and conduct preclinical studies and clinical trials of our product candidates, including MGTA-117;
- develop any other future product candidates we may choose to pursue;
- seek marketing approval for any of our product candidates that successfully complete clinical development, if any;
- maintain compliance with applicable regulatory requirements;
- develop and scale up our capabilities to support our ongoing preclinical activities and clinical trials for our product candidates and commercialization of any of our product candidates for which we obtain marketing approval, if any;
- maintain, expand, protect and enforce our intellectual property portfolio;
- develop and expand our sales, marketing and distribution capabilities for our product candidates for which we obtain marketing approval, if any; and
- expand our operational, financial and management systems and increase personnel, including to support our clinical development and commercialization efforts and our operations as a public company.

We will not generate revenue from product sales unless and until we successfully complete clinical development and obtain regulatory approval for our product candidates. If we obtain regulatory approval for any of our product candidates, we expect to incur significant expenses related to developing our commercialization capability to support product sales, marketing and distribution. Further, we expect to incur additional costs associated with operating as a public company.

As a result, we will need substantial additional funding to support our continuing operations and pursue our growth strategy. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through a combination of equity offerings, debt financings, collaborations, strategic alliances and marketing and distribution or licensing arrangements. We may be unable to raise additional funds or enter into such other agreements or arrangements when needed on favorable terms, or at all. If we fail to raise capital or enter into such agreements as, and when, needed, we may have to significantly delay, scale back or discontinue the development and commercialization of one or more of our product candidates.

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

As of December 31, 2020, we had cash, cash equivalents and marketable securities of $148.8 million. Based on our updated operating plan, we believe that our existing cash, cash equivalents and marketable securities will enable us to fund our operating expenses and capital expenditure requirements into the first quarter of 2023. See “—Liquidity and Capital Resources.”

Impact of the COVID-19 Pandemic

On March 11, 2020, the World Health Organization declared COVID-19 a global pandemic, and on March 13, 2020, the U.S. declared a national emergency with respect to COVID-19. The U.S. federal government subsequently issued initial 15-day social distancing guidelines which were in effect through April 30, 2020 as a measure to reduce the escalation of the spread of COVID-19 in the U.S. More than 40 states and certain U.S. territories, including the Commonwealth of Massachusetts where our operations are located, followed suit and instituted quarantines, restrictions on travel, “stay at home” rules, restrictions on types of businesses that may continue to operate and restrictions on the types of construction projects that may continue. As a result, the COVID-19 pandemic has caused significant disruptions to the U.S., regional and global economies and has contributed to significant volatility and negative pressure in financial markets.

We have been carefully monitoring the COVID-19 pandemic and its potential impact on our business and have taken important steps to help ensure the safety of our employees and their families and to reduce the spread of COVID-19 in the Cambridge community. We have established a work-from-home policy for all employees, other than those who are performing or supporting business-critical research and development operations, such as certain members of our laboratory and facilities staff. For those employees, we have implemented stringent safety measures designed to comply with applicable federal, state and local guidelines instituted in response to the COVID-19 pandemic. We have also maintained efficient communication with our partners and clinical sites as the COVID-19 pandemic has progressed. We have taken these precautionary steps while maintaining business continuity so that we can continue to progress our programs.

The future impact of the COVID-19 pandemic on our industry, the healthcare system and our current and future operations and financial condition will, however, depend on future developments, which are highly uncertain and cannot be predicted with confidence, including the scope, severity and duration of the pandemic, the actions taken to contain the pandemic or mitigate its impact, as well as the effect of any relaxation of current restrictions within the Cambridge community or regions in which our partners and clinical sites are located, and the direct and indirect economic effects of the pandemic and containment measures, among others. See “Item 1A. Risk Factors” for a discussion of the potential adverse impact of COVID-19 on our business, results of operations and financial condition.

Components of Our Results of Operations

Operating Expenses

Research and Development Expenses

Research and development expenses consist primarily of costs incurred for our research activities, including our drug discovery efforts, and the development of our product candidates, which include:

- employee-related expenses, including salaries and related costs, and stock-based compensation expense, for employees engaged in research and development functions;
- expenses incurred in connection with the preclinical and clinical development of our product candidates, including under agreements with contract research organizations, or CROs;
- the cost of consultants and contract manufacturing organizations, or CMOs, that manufacture drug products for use in our preclinical studies and clinical trials;
- facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities, insurance and supplies; and
- payments made under third-party licensing agreements.

We expense research and development costs to operations as incurred. Advance payments for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. The prepaid amounts are expensed as the related goods are delivered or the services are performed.

Our direct research and development expenses are tracked on a program-by-program basis and consist primarily of external costs, such as fees paid to consultants, central laboratories, contractors, CMOs and CROs in connection with our preclinical and clinical development activities. We do not allocate employee costs, costs associated with our platform technology or facility expenses, including depreciation or other indirect costs, to specific product development programs because these costs are deployed across multiple product development programs and, as such, are not separately classified.

The successful development and commercialization of our product candidates is highly uncertain. This is due to the numerous risks and uncertainties, including the following:

- the continuing impact of the COVID-19 pandemic on our industry, the healthcare system, and our current and future operations;
- successful completion of preclinical studies and clinical trials;
- receipt and related terms of marketing approvals from applicable regulatory authorities;
- raising additional funds necessary to complete clinical development of and commercialize our product candidates;
- obtaining and maintaining patent, trade secret and other intellectual property protection and regulatory exclusivity for our product candidates;
- making arrangements with third-party manufacturers, or establishing manufacturing capabilities, for both clinical and commercial supplies of our product candidates;
- developing and implementing marketing and reimbursement strategies;
- establishing sales, marketing and distribution capabilities and launching commercial sales of our products, if and when approved, whether alone or in collaboration with others;
- acceptance of our products, if and when approved, by patients, the medical community and third-party payors;

- effectively competing with other therapies;
- obtaining and maintaining third-party coverage and adequate reimbursement;
- protecting and enforcing our rights in our intellectual property portfolio; and
- maintaining a continued acceptable safety profile of the products following approval.

A change in the outcome of any of these variables with respect to the development of any of our product candidates would significantly change the costs and timing associated with the development of that product candidate. We may never succeed in obtaining regulatory approval for any of our product candidates.

Research and development activities are central to our business model. Product candidates in later stages of clinical development generally have higher development costs than those in earlier stages of clinical development, primarily due to the increased size and duration of later-stage clinical trials. We expect research and development costs to increase significantly for the foreseeable future as our product candidate development programs progress. However, we do not believe that it is possible at this time to accurately project total program-specific expenses through commercialization. There are numerous factors associated with the successful commercialization of any of our product candidates, including future trial design and various regulatory requirements, many of which cannot be determined with accuracy at this time based on our stage of development. Additionally, future commercial and regulatory factors beyond our control will impact our clinical development programs and plans.

General and Administrative Expenses

General and administrative expenses consist primarily of salaries and related costs, and stock-based compensation, for personnel in executive, finance and administrative functions. General and administrative expenses also include direct and allocated facility-related costs and insurance costs, as well as professional fees for legal, patent, consulting, accounting and audit services.

We anticipate that our general and administrative expenses will increase in the future as we increase our headcount to support our continued research activities and development of our product candidates. We also anticipate that we will incur increased costs associated with continuing to operate as a growing public company.

Interest and Other Income, Net

Interest and other income, net, consists of interest income and miscellaneous income and expense unrelated to our core operations.

Income Taxes

Since our inception, we have not recorded any U.S. federal or state income tax benefits for the net losses we have incurred in each year or for our earned research and orphan drug tax credits, due to our uncertainty of realizing a benefit from those items. As of December 31, 2020, we had net operating loss carryforwards for federal income tax purposes of $182.3 million, of which $17.5 million begin to expire in 2035 and $164.8 million can be carried forward indefinitely. As of December 31, 2020, we had net operating loss carryforwards for state income tax purposes of $184.6 million which begin to expire in 2035. As of December 31, 2020, we also had available research and orphan drug tax credit carryforwards for federal and state income tax purposes of $8.4 million and $2.0 million, respectively, which begin to expire in 2035 and 2030, respectively.

Critical Accounting Policies and Significant Judgments and Estimates

Our consolidated financial statements are prepared in accordance with generally accepted accounting principles in the U.S., or GAAP. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, costs and expenses, and the disclosure of contingent assets and liabilities in our consolidated financial statements. We base our estimates on historical experience, known trends and events and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in more detail in Note 2 to our consolidated financial statements included in this Annual Report on Form 10-K, we believe that the following accounting policies are those most critical to the judgments and estimates used in the preparation of our consolidated financial statements.

Research and Development Expenses

As part of the process of preparing our consolidated financial statements, we are required to estimate our accrued research and development expenses. This process involves reviewing open contracts and purchase orders, communicating with our applicable personnel to identify services that have been performed on our behalf and estimating the level of service performed and the associated cost incurred for the service when we have not yet been invoiced or otherwise notified of actual costs. The majority of our service providers invoice us in arrears for services performed, on a pre-determined schedule or when contractual milestones are met; however, some require advance payments. We make estimates of our accrued expenses as of each balance sheet date in the consolidated financial statements based on facts and circumstances known to us at that time. We periodically confirm the accuracy of the estimates with the service providers and make adjustments if necessary. Examples of estimated accrued research and development expenses include fees paid to:

- vendors in connection with the preclinical development activities;
- CROs in connection with preclinical and clinical trials;
- CMOs in connection with the production of preclinical and clinical trial materials; and
- investigative sites in connection with clinical trials.

We base our expenses related to preclinical studies and clinical trials on our estimates of the services received and efforts expended pursuant to quotes and contracts with multiple research institutions and CROs that conduct and manage preclinical studies and clinical trials on our behalf. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows. There may be instances in which payments made to our vendors will exceed the level of services provided and result in a prepayment of the expense. In accruing service fees, we estimate the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from the estimate, we adjust the accrual or prepaid expense accordingly. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may result in reporting amounts that are too high or too low in any particular period. To date, there have not been any material adjustments to our prior estimates of accrued research and development expenses.

Stock-Based Compensation

We measure all stock options and other stock-based awards granted to employees, directors and non-employees based on the fair value on the date of the grant and recognize compensation expense of those awards over the requisite service period, which is generally the vesting period of the respective award. Generally, we issue awards with either service-only vesting conditions and record expense using the straight-line method or service and performance vesting conditions and record expense when achievement of the performance condition becomes probable using the graded-vesting method. We have historically granted stock options with exercise prices equivalent to the fair value of our common stock as of the date of the grant. The fair value of our common stock is based on quoted market prices. We estimate the fair value of each stock option award using the Black-Scholes option-pricing model, which uses as inputs the fair value of our common stock and assumptions we make for the volatility of our common stock, the expected term of our stock options, the risk-free interest rate for a period that approximates the expected term of our stock options and our expected dividend yield. We do not estimate and apply a forfeiture rate as we have elected to account for forfeitures as they occur.

Results of Operations

Comparison of the Years Ended December 31, 2020 and 2019

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

	Year Ended December 31,		
	2020	2019	Change
	(in thousands)		
Operating expenses:			
Research and development	$ 50,615	$ 59,208	$(8,593)
General and administrative	28,087	23,761	4,326
Total operating expenses	78,702	82,969	(4,267)
Loss from operations	(78,702)	(82,969)	4,267
Interest and other income, net	3,766	6,200	(2,434)
Net loss	$ (74,936)	$ (76,769)	$ 1,833

Research and Development Expenses

	Year Ended December 31,		
	2020	2019	Change
	(in thousands)		
Direct research and development expenses by program:			
Conditioning	$ 16,127	$ 18,958	$(2,831)
Mobilization	4,066	6,702	(2,636)
Cell Therapy	4,398	7,167	(2,769)
Unallocated expenses:			
Personnel related (including stock-based compensation)	14,848	13,784	1,064
Consultant (including stock-based compensation)	1,196	2,503	(1,307)
Facility related and other	9,980	10,094	(114)
Total research and development expenses	$ 50,615	$ 59,208	$(8,593)

Expenses related to our conditioning program decreased primarily due to lower process development and manufacturing costs. In 2019, we incurred higher manufacturing costs to support our IND-enabling studies and future clinical trials. The decrease in expenses related to our mobilization program was primarily due to a

decrease in clinical trial costs for our MGTA-145 Phase 1 clinical trials which were completed in the first quarter of 2020. Expenses related to our cell therapy program decreased primarily due to the completion of the investigator-initiated Phase 2 clinical trial of MGTA-456 in patients with blood cancers in the second quarter of 2020 and the discontinuance of the Phase 2 trial in inherited metabolic diseases in June 2020.

The increase in personnel related costs was primarily due to the hiring of more senior level employees in our research and development function. The decrease in consultant costs was primarily due to a decrease in stock-based compensation. Consultant costs for the year ended December 31, 2020 and 2019 included stock-based compensation expense of $0.5 million and $1.6 million, respectively.

General and Administrative Expenses

	Year Ended December 31,		
	2020	2019	Change
		(in thousands)	
Personnel related (including stock-based compensation)	$ 14,219	$ 11,800	$2,419
Professional and consultant	7,290	6,386	904
Facility related and other	6,578	5,575	1,003
Total general and administrative expenses	$ 28,087	$ 23,761	$4,326

The increase in personnel related costs was due primarily to an increase in headcount to support our business including an increase in stock-based compensation. Personnel related costs for the year ended December 31, 2020 and 2019 included stock-based compensation expense of $6.3 million and $5.4 million, respectively. The increase in professional and consultant costs was primarily due to an increase in patent related legal costs. The increase in facility related and other was primarily due to an increase in director and officer insurance and recruiting costs.

Interest and Other Income, Net

The decrease in interest and other income, net was primarily due to a decrease in interest income of $2.5 million resulting from lower interest rates on invested balances.

Liquidity and Capital Resources

Since our inception, we have incurred significant operating losses. We have not yet commercialized any of our product candidates and we do not expect to generate revenue from sales of any product candidates for several years, if at all. In June 2018, we completed the IPO of our common stock. In May 2019, we issued and sold 4,887,500 shares of our common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $13.25 per share, resulting in net proceeds of $60.3 million after deducting underwriting discounts and commissions and other offering expenses. In June 2020, we issued and sold 8,625,000 shares of our common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $8.00 per share, resulting in net proceeds of $64.6 million after deducting underwriting discounts and commission and other offering expenses.

On August 8, 2019, we filed a shelf registration statement on Form S-3, or Shelf, with the Securities and Exchange Commission, or SEC, which covers the offering, issuance and sale by us of up to an aggregate of $350.0 million of our common stock, preferred stock, debt securities, warrants and/or units of any combination thereof. We simultaneously entered into a sales agreement with Cowen and Company, LLC, as sales agent, to provide for the issuance and sale by the Company of up to $100.0 million of our common stock from time to time in "at-the-market" offerings under the Shelf, which we refer to as the ATM Program. The Shelf was declared effective by the SEC on August 19, 2019. As of December 31, 2020, no sales have been made pursuant to the ATM Program.

Cash Flows

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

	Year Ended December 31,	
	2020	2019
	(in thousands)	
Cash used in operating activities	$ (64,023)	$ (57,103)
Cash provided by (used in) investing activities	(10,635)	1,532
Cash provided by financing activities	67,739	62,297
Net increase (decrease) in cash, cash equivalents and restricted cash	$ (6,919)	$ 6,726

Operating Activities

During the year ended December 31, 2020, operating activities used $64.0 million of cash, primarily resulting from our net loss of $74.9 million and net cash used by changes in our operating assets and liabilities of $1.2 million, partially offset by non-cash charges of $12.1 million. Net cash used by changes in our operating assets and liabilities for the year ended December 31, 2020 consisted of a decrease of $2.7 million in accounts payable and accrued expenses and other current liabilities, partially offset by a decrease of $1.4 million in prepaid expenses and other current assets.

During the year ended December 31, 2019, operating activities used $57.1 million of cash, primarily resulting from our net loss of $76.8 million, partially offset by non-cash charges of $10.8 million and cash provided by changes in our operating assets and liabilities of $8.8 million. Net cash provided by changes in our operating assets and liabilities for the year ended December 31, 2019 consisted primarily of a $5.0 million increase in deferred rent and a $5.2 million increase in accounts payable and accrued expenses and other current liabilities, partially offset by an increase of $1.4 million in prepaid expenses and other current assets.

Changes in accounts payable, accrued expenses and other current liabilities and prepaid expenses in both periods were generally due to the timing of vendor invoicing and payments.

Investing Activities

During the year ended December 31, 2020, net cash used by investing activities was primarily attributable to net purchases of marketable securities of $10.2 million.

During the year ended December 31, 2019, net cash provided by investing activities was primarily attributable to net maturities of marketable securities of $4.6 million, partially offset by purchases of property and equipment of $3.1 million, consisting primarily of lab equipment and leasehold improvements.

Financing Activities

During the year ended December 31, 2020, net cash provided by financing activities was $67.7 million, consisting of proceeds from our follow-on public offering, net of underwriting discounts and commissions and offering costs, of $64.6 million and proceeds from the exercise of stock options of $3.1 million.

During the year ended December 31, 2019, net cash provided by financing activities was $62.3 million, consisting of proceeds from our follow-on public offering, net of underwriting discounts, commissions and offering costs, of $60.3 million and proceeds from the exercise of stock options of $2.0 million.

Funding Requirements

We expect our expenses to increase substantially in connection with our ongoing activities, particularly as we advance the preclinical activities and clinical trials for our product candidates in development. In addition, we expect to incur additional costs associated with operating as a public company. The timing and amount of our operating expenditures will depend largely on:

- the initiation, progress, timing, costs and results of current and future preclinical studies and clinical trials for our product candidates, including the continuing impact of the COVID-19 pandemic on our operations;
- the clinical development plans we establish for these product candidates;
- the number and characteristics of product candidates that we develop or may in-license;
- the terms of any collaboration agreements we may choose to conclude;
- the outcome, timing and cost of meeting and maintaining compliance with regulatory requirements established by the Food and Drug Administration, the European Medical Agency and other comparable foreign regulatory authorities;
- the cost of filing, prosecuting, defending and enforcing our patent claims and other intellectual property rights;
- the cost of defending intellectual property disputes, including patent infringement actions brought by third parties against us;
- the effect of existing or new competing technological and market developments;
- the cost and timing of completion of commercial-scale outsourced manufacturing activities; and
- the cost of establishing sales, marketing and distribution capabilities for any product candidates for which we may receive regulatory approval in regions where we choose to commercialize our products on our own.

As of December 31, 2020, we had cash, cash equivalents and marketable securities of $148.8 million. We believe that our existing cash, cash equivalents and marketable securities will enable us to fund our operating expenses and capital expenditure requirements into the first quarter of 2023. We have based these estimates on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we expect. Because of the numerous risks and uncertainties associated with research, development and commercialization of pharmaceutical product candidates, we are unable to estimate the exact amount of our working capital requirements. Our future funding requirements will depend on and could increase significantly as a result of many factors, including those listed above.

Until such time, if ever, as we can generate substantial product revenue, we expect to finance our operations through a combination of equity offerings, including sales under our ATM Program, debt financings, collaborations, strategic alliances and marketing, distribution or licensing arrangements. We do not currently have any committed external source of funds. To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholders' ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect our stockholders' rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making acquisitions or capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings or other arrangements when needed, we may be required to delay, limit, reduce or terminate

our research, product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves. Although we continue to pursue these plans, there is no assurance that we will be successful in obtaining sufficient funding on terms acceptable to us to fund continuing operations, if at all.

Off-Balance Sheet Arrangements

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

Recently Issued and Adopted Accounting Pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position and results of operations is disclosed in Note 2 to our consolidated financial statements included in this Annual Report on Form 10-K.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are a smaller reporting company, as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, for this reporting period and are not required to provide the information required under this item.

ITEM 8. CONSOLIDATED FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

MAGENTA THERAPEUTICS, INC.

Index to Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
Magenta Therapeutics, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Magenta Therapeutics, Inc. and subsidiary (the Company) as of December 31, 2020 and 2019, the related consolidated statements of operations and comprehensive loss, consolidated statements of stockholders' equity, and consolidated statements of cash flows for each of the years then ended, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the years then ended, in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated 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 consolidated 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 consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP
We have served as the Company's auditor since 2017.

Boston, Massachusetts
March 3, 2021

MAGENTA THERAPEUTICS, INC.

CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share amounts)

	December 31, 2020	December 31, 2019
Assets		
Current assets:		
Cash and cash equivalents	$ 58,152	$ 65,071
Marketable securities	90,683	80,658
Prepaid expenses and other current assets	2,692	4,114
Total current assets	151,527	149,843
Restricted cash	1,780	1,780
Property and equipment, net	8,312	9,891
Total assets	$ 161,619	$ 161,514
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 3,760	$ 2,812
Accrued expenses and other current liabilities	7,670	11,303
Total current liabilities	11,430	14,115
Deferred rent	6,283	6,206
Total liabilities	17,713	20,321
Commitments and contingencies (Note 8)		
Stockholders' Equity:		
Preferred stock, $0.001 par value; 10,000,000 shares authorized; no shares issued or outstanding	—	—
Common stock, $0.001 par value; 150,000,000 shares authorized; 48,541,601 shares and 39,466,254 shares issued and 48,533,135 shares and 39,260,532 shares outstanding as of December 31, 2020 and 2019, respectively	49	39
Additional paid-in capital	398,311	320,641
Accumulated other comprehensive income (loss)	(23)	8
Accumulated deficit	(254,431)	(179,495)
Total stockholders' equity	143,906	141,193
Total liabilities and stockholders' equity	$ 161,619	$ 161,514

The accompanying notes are an integral part of these consolidated financial statements.

MAGENTA THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS

(In thousands, except share and per share amounts)

	Year Ended December 31,	
	2020	2019
Operating expenses:		
Research and development	$ 50,615	$ 59,208
General and administrative	28,087	23,761
Total operating expenses	78,702	82,969
Loss from operations	(78,702)	(82,969)
Interest and other income, net	3,766	6,200
Net loss	$ (74,936)	$ (76,769)
Net loss per share, basic and diluted	$ (1.71)	$ (2.07)
Weighted average common shares outstanding, basic and diluted	43,920,121	37,014,875
Comprehensive loss:		
Net loss	$ (74,936)	$ (76,769)
Other comprehensive income (loss):		
Unrealized gains (losses) on marketable securities	(31)	16
Total other comprehensive income (loss)	(31)	16
Total comprehensive loss	$ (74,967)	$ (76,753)

The accompanying notes are an integral part of these consolidated financial statements.

MAGENTA THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands, except share amounts)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balances at December 31, 2018	33,305,033	$ 33	$248,349	$ (8)	$ (102,726)	$ 145,648
Issuance of common stock upon public offering net of underwriting discounts, commissions and offering costs	4,887,500	5	60,271	—	—	60,276
Vesting of restricted stock	773,689	1	(1)	—	—	—
Issuance of common stock upon exercise of stock options	294,310	—	2,021	—	—	2,021
Stock-based compensation expense	—	—	10,001	—	—	10,001
Unrealized gains on marketable securities	—	—	—	16	—	16
Net loss	—	—	—	—	(76,769)	(76,769)
Balances at December 31, 2019	39,260,532	39	320,641	8	(179,495)	141,193
Issuance of common stock upon public offering net of underwriting discounts, commissions and offering costs	8,625,000	9	64,554	—	—	64,563
Vesting of restricted stock	184,500	—	—	—	—	—
Issuance of common stock upon exercise of stock options	447,402	1	3,071	—	—	3,072
Issuance of common stock under Employee Stock Purchase Plan	15,701	—	104	—	—	104
Stock-based compensation expense	—	—	9,941	—	—	9,941
Unrealized losses on marketable securities	—	—	—	(31)	—	(31)
Net loss	—	—	—	—	(74,936)	(74,936)
Balances at December 31, 2020	48,533,135	$ 49	$398,311	$ (23)	$ (254,431)	$ 143,906

The accompanying notes are an integral part of these consolidated financial statements.

MAGENTA THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Year ended December 31,	
	2020	2019
Cash flows from operating activities:		
Net loss	$(74,936)	$ (76,769)
Adjustments to reconcile net loss to net cash used in operating activities:		
Stock-based compensation expense	9,941	10,001
Depreciation and amortization expense	1,978	1,843
Loss on disposal of property and equipment	1	—
Net amortization (accretion) of premiums (discounts) on marketable securities	179	(1,009)
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	1,422	(1,363)
Accounts payable	948	145
Accrued expenses and other current liabilities	(3,633)	5,089
Deferred rent	77	4,960
Net cash used in operating activities	(64,023)	(57,103)
Cash flows from investing activities:		
Purchases of property and equipment	(400)	(3,060)
Purchases of marketable securities	(95,735)	(144,371)
Maturities of marketable securities	85,500	148,963
Net cash provided by (used in) investing activities	(10,635)	1,532
Cash flows from financing activities:		
Proceeds from public offerings, net of underwriting discounts and commissions	64,860	60,874
Payments of public offering costs	(297)	(598)
Proceeds from exercise of common stock options	3,072	2,021
Proceeds from issuance of common stock under Employee Stock Purchase Plan	104	—
Net cash provided by financing activities	67,739	62,297
Net increase (decrease) in cash, cash equivalents and restricted cash	(6,919)	6,726
Cash, cash equivalents and restricted cash at beginning of period	66,851	60,125
Cash, cash equivalents and restricted cash at end of period	$ 59,932	$ 66,851

The accompanying notes are an integral part of these consolidated financial statements.

MAGENTA THERAPEUTICS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Nature of the Business and Basis of Presentation

Magenta Therapeutics, Inc. (the "Company") is a clinical-stage biotechnology company developing novel medicines to bring the curative power of stem cell transplants to more patients with blood cancers, genetic diseases and autoimmune diseases. The Company was incorporated under the laws of the State of Delaware in June 2015 as HSCTCo Therapeutics, Inc. In February 2016, the Company changed its name to Magenta Therapeutics, Inc. and in June 2018 the Company completed its initial public offering of common stock.

The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations, the continuing impact of the novel coronavirus ("COVID-19") pandemic and the ability to secure additional capital to fund operations. Product candidates currently under development will require significant additional research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if the Company's development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

In May 2019, the Company issued and sold 4,887,500 shares of its common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $13.25 per share, resulting in net proceeds of $60.3 million after underwriting discounts and commissions and other offering expenses. In June 2020, the Company issued and sold 8,625,000 shares of its common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $8.00 per share, resulting in net proceeds of $64.6 million after underwriting discounts and commissions and other offering expenses.

The Company has a shelf registration statement on Form S-3 (the "Shelf") on file with the Securities and Exchange Commission (the "SEC"), which covers the offering, issuance and sale of up to an aggregate of $350.0 million of common stock, preferred stock, debt securities, warrants and/or units of any combination thereof. The Company simultaneously entered into a sales agreement with Cowen and Company, LLC, as sales agent, to provide for the issuance and sale by the Company of up to $100.0 million of common stock from time to time in "at-the-market" offerings under the Shelf (the "ATM Program"). The Shelf was declared effective by the SEC on August 19, 2019. As of December 31, 2020, no sales have been made pursuant to the ATM Program.

The Company has incurred recurring losses since inception, including net losses of $74.9 million and $76.8 million for the years ended December 31, 2020 and 2019, respectively. As of December 31, 2020, the Company had an accumulated deficit of $254.4 million. The Company expects to continue to generate operating losses for the foreseeable future. The Company expects that its cash, cash equivalents and marketable securities will be sufficient to fund its operating expenses and capital expenditure requirements through at least 12 months from the issuance date of these consolidated financial statements. The future viability of the Company beyond that point is dependent on its ability to raise additional capital to fund its operations.

The Company expects its expenses to increase substantially in connection with ongoing activities, particularly as the Company advances its preclinical activities and clinical trials for its product candidates in development. Accordingly, the Company will need to obtain substantial additional funding in connection with continuing operations. If the Company is unable to raise capital when needed, or on attractive terms, it could be forced to delay, reduce or eliminate its research or drug development programs or any future commercialization

efforts. Although management continues to pursue these plans, there is no assurance that the Company will be successful in obtaining sufficient funding on terms acceptable to the Company to fund continuing operations, if at all.

The consolidated financial statements include the accounts of the Company and its wholly owned subsidiary. All intercompany balances and transactions have been eliminated.

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP").

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of expenses during the reporting periods. Significant estimates and assumptions reflected in these financial statements include, but are not limited to, the accrual for research and development expenses and the valuation of stock-based awards. Estimates are periodically reviewed in light of changes in circumstances, facts and experience. Changes in estimates are recorded in the period in which they become known. Actual results could differ from those estimates.

Concentrations of Credit Risk and of Significant Suppliers

Financial instruments that potentially expose the Company to concentrations of credit risk consist primarily of cash, cash equivalents and marketable securities. The Company maintains all cash, cash equivalents and marketable securities at two accredited financial institutions in amounts that exceed federally insured limits. The Company does not believe that it is subject to unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

The Company is dependent on third-party manufacturers to supply products for research and development activities in its programs. In particular, the Company relies and expects to continue to rely on a small number of manufacturers to supply it with its requirements for the active pharmaceutical ingredients and formulated drugs related to these programs. These programs could be adversely affected by a significant interruption in the supply of active pharmaceutical ingredients and formulated drugs.

Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less at the date of purchase to be cash equivalents.

Marketable Securities

The Company's marketable securities are classified as available-for-sale and are carried at fair value with the unrealized gains and losses reported as a component of accumulated other comprehensive income (loss) in stockholders' equity. Realized gains and losses and declines in value judged to be other than temporary are included as a component of interest and other income, net based on the specific identification method. The Company classifies its marketable securities with maturities beyond one year as short-term, based on their highly liquid nature and because such marketable securities are available for current operations.

Property and Equipment

Property and equipment are stated at cost less accumulated depreciation and amortization. Depreciation and amortization expense is recognized using the straight-line method over the estimated useful life of each asset as follows:

	Estimated Useful Life
Lab equipment	5 years
Computer equipment	3 years
Furniture and fixtures	5 years
Leasehold improvements	Shorter of life of lease or estimated useful life

Upon retirement or sale, the cost of assets disposed of and the related accumulated depreciation and amortization are removed from the accounts and any resulting gain or loss is included in loss from operations. Expenditures for repairs and maintenance are charged to expense as incurred.

Impairment of Long-Lived Assets

Long-lived assets consist of property and equipment. Long-lived assets to be held and used are tested for recoverability whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable. Factors that the Company considers in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative industry or economic trends and significant changes or planned changes in the use of the assets. If an impairment review is performed to evaluate a long-lived asset group for recoverability, the Company compares forecasts of undiscounted cash flows expected to result from the use and eventual disposition of the long-lived asset group to its carrying value. An impairment loss would be recognized when estimated undiscounted future cash flows expected to result from the use of an asset group are less than its carrying amount. The impairment loss would be based on the excess of the carrying value of the impaired asset group over its fair value, determined based on discounted cash flows. The Company did not record any impairment losses on long-lived assets during the years ended December 31, 2020 or 2019.

Fair Value Measurements

Certain assets and liabilities are carried at fair value under GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

The Company’s cash equivalents and marketable securities are carried at fair value, determined according to the fair value hierarchy described above (see Note 3). The carrying values of the Company’s accounts payable and accrued expenses approximate their fair values due to the short-term nature of these assets and liabilities.

Deferred Rent

The Company's lease agreements include payment escalations and lease incentives, which are accrued or deferred as appropriate such that rent expense for each lease is recognized on a straight-line basis over the respective lease term. Adjustments for such items, consisting primarily of tenant improvement allowances and payment escalations, are recorded as deferred rent and amortized over the lease term.

Segment Information

The Company manages its operations as a single segment for the purposes of assessing performance and making operating decisions. All of the Company's tangible assets are held in the United States.

Research and Development Costs

Research and development costs are expensed as incurred. Research and development expenses are comprised of costs incurred in performing research and development activities, including salaries, stock-based compensation and benefits, facilities costs, depreciation, manufacturing expenses and external costs of outside vendors engaged to conduct preclinical development activities and clinical trials as well as the cost of licensing technology.

Upfront payments and milestone payments made for the licensing of technology are expensed as research and development in the period in which they are incurred. Advance payments for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. The prepaid amounts are expensed as the related goods are delivered or the services are performed.

Research Contract Costs and Accruals

The Company has entered into various research and development contracts with research institutions and other companies both inside and outside of the United States. These agreements are generally cancelable, and related payments are recorded as research and development expenses as incurred. The Company records accruals for estimated ongoing research costs. When evaluating the adequacy of the accrued liabilities, the Company analyzes progress of the studies or trials, including the phase or completion of events, invoices received and contracted costs. Significant judgments and estimates are made in determining the accrued balances at the end of any reporting period. Actual results could differ from the Company's estimates. The Company's historical accrual estimates have not been materially different from the actual costs.

Patent Costs

All patent-related costs incurred in connection with filing and prosecuting patent applications are expensed as incurred due to the uncertainty about the recovery of the expenditure. Amounts incurred are classified as general and administrative expenses.

Stock-Based Compensation

The Company measures all stock-based awards granted to employees, directors and non-employees based on the fair value on the date of grant. Compensation expense of those awards is recognized over the requisite service period, which is generally the vesting period of the respective award. Generally, the Company issues awards with either service-only vesting conditions and records the expense using the straight-line method or service and performance vesting conditions and records the expense when achievement of the performance condition becomes probable using the graded-vesting method. The Company accounts for forfeitures as they occur.

The fair value of stock option grants is estimated using the Black-Scholes option-pricing model. The Company historically has been a private company and lacks company-specific historical and implied volatility

information. Therefore, the Company estimates its expected stock volatility based on the historical volatility of a publicly traded set of peer companies along with the volatility of its own stock and expects to continue to do so until such time as it has adequate historical data regarding the volatility of its own traded stock price. For options with service-based vesting conditions, the expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla" options. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends and does not expect to pay any cash dividends in the foreseeable future.

The Company classifies stock-based compensation expense in its statements of operations and comprehensive loss in the same manner in which the award recipient's payroll costs are classified or in which the award recipient's service payments are classified.

Income Taxes

The Company accounts for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in the consolidated financial statements or in the Company's tax returns. Deferred taxes are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect in the years in which the differences are expected to reverse. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes. The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent it believes, based upon the weight of available evidence, that it is more likely than not that all or a portion of deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. Potential for recovery of deferred tax assets is evaluated by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies.

The Company accounts for uncertainty in income taxes recognized in its consolidated financial statements by applying a two-step process to determine the amount of tax benefit to be recognized. First, the tax position must be evaluated to determine the likelihood that it will be sustained upon external examination by the taxing authorities. If the tax position is deemed more-likely-than-not to be sustained, the tax position is then assessed to determine the amount of benefit to recognize in the consolidated financial statements. The amount of the benefit that may be recognized is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The provision for income taxes includes the effects of any resulting tax reserves, or unrecognized tax benefits, that are considered appropriate as well as the related net interest and penalties.

Comprehensive Loss

Comprehensive loss includes net loss as well as other changes in stockholders' equity that result from transactions and economic events other than those with stockholders. For the years ended December 31, 2020 and 2019, the Company's only element of other comprehensive loss was unrealized gains (losses) on marketable securities.

Net Loss per Share

Basic net income (loss) per share is computed by dividing the net income (loss) by the weighted average number of shares of common stock outstanding for the period. Diluted net income (loss) per share is computed by dividing net income (loss) by the weighted average number of common shares outstanding for the period, including potential dilutive common shares assuming the dilutive effect of outstanding stock options. For periods in which the Company has reported net losses, diluted net loss per common share is the same as basic net loss per common share, since dilutive common shares are not assumed to have been issued if their affect is anti-dilutive.

The Company reported a net loss for the years ended December 31, 2020 and 2019. The following potential dilutive securities presented based on amounts outstanding at each period end, have been excluded from the calculation of diluted net loss per share because including them would have had an anti-dilutive impact:

	As of December 31,	
	2020	2019
Stock options to purchase common stock	5,622,868	4,688,133
Unvested restricted common stock and units	373,466	205,722
Shares of common stock issuable under Employee Stock Purchase Plan	15,443	4,213
	6,011,777	4,898,068

Recently Adopted Accounting Pronouncements

In December 2019, the Financing Accounting Standards Board (the "FASB") issued Accounting Standards Update ("ASU") No. 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes* ("ASU 2019-12"). ASU 2019-12 includes several provisions to simplify the accounting for income taxes and removes certain exceptions for recognizing deferred taxes for investments, performing intraperiod allocation and calculating income taxes in interim periods. For public entities, the guidance is effective for annual reporting periods beginning after December 15, 2020 and for interim periods within those fiscal years. For nonpublic entities and emerging growth companies that choose to take advantage of the extended transition period, the guidance is effective for annual reporting periods beginning after December 15, 2021 and interim periods within fiscal years beginning after December 15, 2022. Early adoption is permitted for all entities. The Company early adopted ASU 2019-12 prospectively effective January 1, 2020 and the adoption did not have a material impact on the Company's consolidated financial statements.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU No. 2016-02, *Leases* ("ASU 2016-02"). ASU 2016-02 will require lessees to recognize most leases on their balance sheet as a right-of-use asset and a lease liability. Leases will be classified as either operating or finance, and classification will be based on criteria similar to current lease accounting, but without explicit bright lines. For public entities, the guidance was effective for annual reporting periods beginning after December 15, 2018 and for interim periods within those fiscal years. For nonpublic entities and emerging growth companies that choose to take advantage of the extended transition period, the guidance was effective for annual reporting periods beginning after December 15, 2019. In June 2020, the FASB issued ASU No. 2020-05, which further deferred the effective date for nonpublic entities to annual reporting periods beginning after December 15, 2021, and interim periods within fiscal years beginning after December 15, 2022. Early adoption is permitted for all entities. ASU 2016-02 initially required adoption using a modified retrospective approach, under which all years presented in the financial statements would be prepared under the revised guidance. In July 2018, the FASB issued ASU No. 2018-11, *Leases (Topic 842) Targeted Improvements*, which added an optional transition method to the existing requirements whereby an entity could adopt the provisions of ASU 2016-02 by recognizing a cumulative-effective adjustment to the opening balance of retained earnings in the period of adoption without adjustment to the financial statements for periods prior to adoption. The Company expects that the adoption of the new leasing standards will result in the recognition of material right-of-use assets and lease liabilities on the consolidated balance sheets but does not expect it to have a material impact on its results of operations or cash flows.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments – Credit Losses (Topic 326)*. The new standard adjusts the accounting for assets held at amortized costs basis, including marketable securities accounted for as available for sale. The standard eliminates the probable initial recognition threshold and requires an entity to reflect its current estimate of all expected credit losses. The allowance for credit losses is a valuation

account that is deducted from the amortized cost basis of the financial assets to present the net amount expected to be collected. For public entities, the guidance was effective for annual reporting periods beginning after December 15, 2019 and for interim periods within those fiscal years. For nonpublic entities and emerging growth companies that choose to take advantage of the extended transition period, the guidance is effective for annual reporting periods beginning after December 15, 2020. Early adoption is permitted for all entities. In November 2019, the FASB issued ASU No. 2019-10, which deferred the effective date for nonpublic entities to annual reporting periods beginning after December 15, 2022, including interim periods within those fiscal years. The Company does not believe the guidance will have a material impact on its consolidated financial statements.

3. Marketable Securities and Fair Value Measurements

As of December 31, 2020, marketable securities by security type consisted of (in thousands):

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
U.S. treasury notes (due within one year)	$ 90,706	$ —	$ (23)	$ 90,683
Total	$ 90,706	$ —	$ (23)	$ 90,683

As of December 31, 2019, marketable securities by security type consisted of (in thousands):

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
U.S. treasury notes (due within one year)	$ 78,656	$ 25	$ (21)	$ 78,660
Agency bonds (due within one year)	1,994	4	—	1,998
Total	$ 80,650	$ 29	$ (21)	$ 80,658

The following tables present information about the Company's financial assets measured at fair value on a recurring basis and indicate the level of the fair value hierarchy utilized to determine such fair values (in thousands):

	Fair Value Measurements at December 31, 2020 Using:			
	Level 1	Level 2	Level 3	Total
Cash equivalents:				
Money market funds	$ 43,182	$ —	$ —	$ 43,182
U.S. treasury notes	—	14,999	—	14,999
Marketable securities:				
U.S. treasury notes	—	90,683	—	90,683
Total	$ 43,182	$ 105,682	$ —	$ 148,864

	Fair Value Measurements at December 31, 2019 Using:			
	Level 1	Level 2	Level 3	Total
Cash equivalents:				
Money market funds	$ 64,796	$ —	$ —	$ 64,796
Marketable securities:				
U.S. treasury notes	—	78,660	—	78,660
Agency bonds	—	1,998	—	1,998
Total	$ 64,796	$ 80,658	$ —	$ 145,454

4. Property and Equipment, Net

Property and equipment, net consisted of the following (in thousands):

	December 31,	
	2020	2019
Laboratory and computer equipment	$ 5,477	$ 5,114
Furniture and fixtures	837	805
Leasehold improvements	6,905	6,905
	13,219	12,824
Less: Accumulated depreciation and amortization	(4,907)	(2,933)
	$ 8,312	$ 9,891

Depreciation and amortization expense was $2.0 million and $1.8 million for the years ended December 31, 2020 and 2019, respectively.

5. Accrued Expenses

Accrued expenses consisted of the following (in thousands):

	December 31,	
	2020	2019
Accrued payroll and related expenses	$3,107	$ 3,247
Accrued external research and development expenses	2,662	6,516
Deferred rent, current portion	555	601
Accrued professional fees	693	660
Accrued other	653	279
	$7,670	$11,303

6. Common Stock

On May 6, 2019, the Company issued and sold 4,887,500 shares of its common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $13.25 per share, resulting in net proceeds of $60.3 million after underwriting discounts and commission and other offering expenses.

In June 2020, the Company issued and sold 8,625,000 shares of its common stock, including the underwriters' exercise in full of their option to purchase additional shares of common stock, in a follow-on public offering at a public offering price of $8.00 per share, resulting in net proceeds of $64.6 million after underwriting discounts and commissions and other offering expenses.

In August 2019, the Company filed a shelf registration statement on Form S-3 (the "Shelf") with the Securities and Exchange Commission (the "SEC"), which covers the offering, issuance and sale of up to an aggregate of $350.0 million of common stock, preferred stock, debt securities, warrants and/or units of any combination thereof. The Company simultaneously entered into a Sales Agreement with Cowen and Company, LLC, as sales agent, to provide for the issuance and sale by the Company of up to $100.0 million of common stock from time to time in "at-the-market" offerings under the Shelf (the "ATM Program"). The Shelf was declared effective by the SEC on August 19, 2019. As of December 31, 2020, no sales have been made pursuant to the ATM Program.

Each share of common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders. Common stockholders are not entitled to receive dividends unless declared by the board of directors.

7. Stock-Based Compensation

2018 Stock Option and Incentive Plan

The Magenta Therapeutics, Inc. 2018 Stock Option and Incentive Plan (the "2018 Plan") provides for the grant of incentive stock options, non-statutory stock options, restricted stock, restricted stock units, stock appreciation rights, performance units and performance shares to employees, directors and consultants. Shares of common stock underlying any awards under the 2018 Plan and the Magenta Therapeutics, Inc. 2016 Stock Option and Grant Plan (the "2016 Plan") that are forfeited, cancelled, held back upon exercise or settlement of an award to satisfy the exercise price or tax withholding, reacquired by the Company prior to vesting, satisfied without any issuance of stock, expire or are otherwise terminated (other than by exercise) will be available for future awards under the 2018 Plan. As of December 31, 2020, 2,432,666 shares remained available for future grants under the 2018 Plan.

The 2018 Plan provides that the number of shares reserved and available for issuance under the 2018 Plan will automatically increase each January 1 by 4% of the outstanding number of shares of the Company's common stock on the immediately preceding December 31 or such lesser number of shares as determined by the Company's compensation committee. This number is subject to adjustment in the event of a stock split, stock dividend or other change in capitalization. The number of shares reserved for issuance under the 2018 Plan was increased by 1,941,325 shares effective January 1, 2021.

2016 Stock Option and Grant Plan

The Company also has outstanding stock options and restricted stock awards under the 2016 Plan, but is no longer granting awards under this plan.

The 2018 Plan is administered by the board of directors, or at the discretion of the board of directors, by a committee of the board. The exercise prices, vesting and other restrictions are determined at the discretion of the board of directors, or their committee if so delegated, except that the term of awards may not be greater than ten years. Vesting periods are determined at the discretion of the board of directors. Awards typically vest over three or four years. The exercise price for stock options granted may not be less than the fair value of common stock as of the date of grant. The fair value of common stock is based on quoted market prices.

2019 Employee Stock Purchase Plan

The Magenta Therapeutics, Inc. 2019 Employee Stock Purchase Plan (the "ESPP") became effective in June 2019. An aggregate of 166,525 shares were reserved for issuance under the ESPP. In addition, on January 1, 2020 and each January 1 thereafter through January 1, 2029, the number of shares available for issuance shall be cumulatively increased by the lesser of (i) 1% of the number of shares issued and outstanding on the immediately preceding December 31, (ii) 1,000,000 shares and (iii) such number of shares as determined by the compensation committee of the Company's board of directors. The offering periods begin in December and June of each year, with the initial offering period commencing on December 1, 2019. The purchase price of common stock under the ESPP is equal to 85% of the lower of the fair market value of the common stock on the offering date or the exercise date. During the year ended December 31, 2020, 15,701 shares of common stock were purchased under the ESPP at a weighted average purchase price of $6.59 per share. During the year ended December 31, 2019, no shares were purchased under the ESPP. As of December 31, 2020, 150,824 shares remained available for issuance under the ESPP. The Company recognized less than $0.1 million of stock-based compensation during each of the years ended December 31, 2020 and 2019 related to the ESPP. The number of shares reserved for issuance under the ESPP did not increase on January 1, 2021.

Common Stock Option Valuation

The assumptions that the Company used to determine the fair value of options granted were as follows, presented on a weighted average basis:

	Year Ended December 31,	
	2020	2019
Risk-free interest rate	1.0%	2.3%
Expected term (in years)	6.0	6.0
Expected volatility	80.4%	78.5%
Expected dividend yield	0%	0%

Common Stock Option Activity

The following table summarizes the Company's option activity since December 31, 2019:

	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding as of December 31, 2019	4,688,133	$ 8.88	8.6	$ 29,634
Granted	2,730,023	10.09		
Exercised	(447,402)	6.87		
Forfeited	(1,347,886)	9.28		
Outstanding as of December 31, 2020	5,622,868	$ 9.54	8.3	$ 2,136
Options vested and expected to vest as of December 31, 2020	5,622,868	$ 9.54	8.3	$ 2,136
Options exercisable as of December 31, 2020	2,277,399	$ 9.52	7.7	$ 908

The aggregate intrinsic value of options is calculated as the difference between the exercise price of the options and the fair value of the Company's common stock for those options that had exercise prices lower than the fair value of the Company's common stock. The aggregate intrinsic value of options exercised during the years ended December 31, 2020 and 2019 was $1.1 million and $2.3 million, respectively.

The weighted average grant-date fair value per share of stock options granted during the years ended December 31, 2020 and 2019 was $6.90 and $6.05, respectively.

Restricted Stock Activity

Unvested shares of restricted stock may not be sold or transferred by the holder. These restrictions lapse according to the time-based vesting conditions of each award.

The table below summarizes the Company's restricted stock activity for grants issued under the 2016 Plan since December 31, 2019:

	Number of Shares	Weighted Average Grant Date Fair Value
Outstanding as of December 31, 2019	205,722	$ 1.76
Vested	(184,500)	1.66
Forfeited	(12,756)	1.13
Outstanding as of December 31, 2020	8,466	$ 4.84

The total fair value of restricted stock vested during the years ended December 31, 2020 and 2019 was $1.7 million and $9.3 million, respectively.

Restricted Stock Units

During the year ended December 31, 2020, the Company granted service-based restricted stock units to certain employees. Upon vesting, each restricted stock unit entitles the holder to a specified number of shares of common stock.

The table below summarizes the Company's restricted stock unit activity since December 31, 2019:

	Number of Shares	Weighted Average Grant Date Fair Value
Outstanding as of December 31, 2019	—	$ —
Granted	220,000	$ 6.80
Vested	—	—
Forfeited	(15,000)	$ 6.80
Outstanding as of December 31, 2020	205,000	$ 6.80

Performance Restricted Stock Units

During the year ended December 31, 2020, the Company granted performance-based restricted stock units to certain senior employees which vest upon the occurrence of certain operational and financial events. At the achievement of the performance-based vesting criteria, each performance-based restricted stock unit entitles the holder to a specified number of shares of common stock.

The table below summarizes the Company's performance restricted stock unit activity since December 31, 2019:

	Number of Shares	Weighted Average Grant Date Fair Value
Outstanding as of December 31, 2019	—	$ —
Granted	160,000	$ 6.75
Vested	—	—
Forfeited	—	—
Outstanding as of December 31, 2020	160,000	$ 6.75

Stock-Based Compensation

Stock-based compensation expense was classified in the consolidated statements of operations and comprehensive loss as follows (in thousands):

	Year Ended December 31,	
	2020	2019
Research and development expenses	$3,542	$ 4,518
General and administrative expenses	6,399	5,483
	$9,941	$10,001

As of December 31, 2020, total unrecognized compensation cost related to the unvested stock-based awards was $18.7 million, which is expected to be recognized over a weighted average period of 2.6 years. This amount excludes unrecognized compensation cost of $1.1 million related to the performance restricted stock units as the performance conditions are not considered probable of achievement as of December 31, 2020.

8. Commitments and Contingencies

Leases

In May 2018, the Company entered into a sublease for up to approximately 69,000 square feet of office and laboratory space in Cambridge, Massachusetts. The sublease was amended effective March 2019 to increase the lease payments over the lease term and to increase the sublandlord-funded tenant improvements. The sublease is subject and subordinate to a prime lease between the sublandlord and the prime landlord. The term of the sublease commenced in June 2018 and expires in February 2028. The sublandlord has the right to terminate the sublease after five years. The Company is also obligated to pay real estate taxes and other costs related to the premises, including costs of operations and management of the leased premises. In connection with the sublease, as amended, the sublandlord funded $5.2 million in tenant improvements to the leased facility during 2019. The Company is required to maintain a cash balance of $1.8 million to secure a letter of credit associated with the sublease. This amount was classified as noncurrent restricted cash in the consolidated balance sheets at December 31, 2020 and 2019.

As of December 31, 2020 and 2019, the Company had long-term deferred rent of $6.3 million and $6.2 million, respectively, related to lease incentives and payment escalations. As of December 31, 2020 and 2019, the short-term portion of deferred rent of $0.6 million for each period was included in accrued expenses and other current liabilities. The Company recorded rent expense of $6.2 million and $6.1 million, respectively, during the years ended December 31, 2020 and 2019.

As of December 31, 2020, the future minimum lease payments due under the noncancelable operating lease is as follows (in thousands):

2021	$ 6,072
2022	6,375
2023	6,734
2024	7,100
2025	7,455
Thereafter	17,444
	$ 51,180

In the fourth quarter of 2018, the Company entered into two two-year sub-subleases of approximately 27,000 square feet of office space in Cambridge, Massachusetts which were both set to expire in the fourth quarter of 2020. In the third quarter of 2020, the Company amended each of the sub-subleases to extend their expirations to July 2021 and April 2022, respectively. As of December 31, 2020, the remaining rent payments due to the Company under the amended sub-subleases was $2.3 million. The Company recorded other income of $2.9 million and $2.8 million during the years ended December 31, 2020 and 2019, respectively, related to these sub-subleases.

Collaboration Agreement

In March 2018, the Company entered into a collaboration agreement with Heidelberg Pharma Research GmbH (“HDPR”) whereby the parties agreed to combine the Company’s stem cell platform with proprietary antibodies across up to four exclusive targets with HDPR’s proprietary Antibody Targeted Amanitin Conjugates platform. Under the agreement, the Company may pay upfront technology access fees, research exclusivity fees and payment for research support. Additionally, upon the exercise of certain license rights, the Company may be obligated to pay HDPR development, regulatory and commercial milestone payments of up to $83.5 million per target as well as royalties on net sales of products licensed under the agreement. During the years ended December 31, 2020 and 2019, the Company recorded $0.7 million and $1.9 million, respectively, of research and development expense related to this agreement for upfront technology access fees, research exclusivity fees and research support.

Intellectual Property Licenses

The Company has a license agreement with the President and Fellows of Harvard College (“Harvard”), entered into in November 2016, for an exclusive, worldwide, royalty-bearing license for certain technologies related to conditioning and mobilization. The Company is obligated to pay Harvard maintenance fees of $0.1 million annually and to reimburse qualified expenses related to the patents. The Company is also obligated to pay milestone payments of up to $7.4 million for the first two licensed products upon the achievement of certain development and regulatory milestones and to pay royalties on a product-by-product and country-by-country basis on net sales of products licensed under the agreement. During each of the years ended December 31, 2020 and 2019, the Company recorded $0.1 million of research and development expenses related to the achievement of two of these milestones.

The Company has a license agreement with Novartis International Pharmaceutical Ltd. (“Novartis”), entered into in April 2017, to use and develop certain patent rights (the “Novartis License”). Under the Novartis License, the Company was granted an exclusive, worldwide, sublicensable license to research, develop and commercialize certain licensed products that contain Novartis compounds for the expansion of cord blood derived non-gene-edited/-modified hematopoietic stem cells. The Company is obligated to make payments of up to $177.0 million upon the achievement of specified clinical and regulatory milestones and up to $125.0 million upon the achievement of specified commercial milestones and to pay tiered royalties, on a product-by-product and country-by-country basis, up to a maximum of 20% on net sales of products licensed under the agreement. As of December 31, 2020, no milestones related to the Novartis License have been met.

The Company has agreements with third parties in the normal course of business, under which it can license certain developed technologies. If the Company exercises its rights to license the respective technologies, it may be subject to additional fees and milestone payments. During the year ended December 31, 2020, the Company recorded research and development expense of $0.8 million related to the license of certain developed technologies under these agreements.

Indemnification Agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to vendors, lessors, business partners and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third parties. In addition, the Company has entered into indemnification agreements with members of its board of directors and senior management that will require the Company, among other things, to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, unlimited. To date, the Company has not incurred any material costs as a result of such indemnifications. The Company is not aware of any claims under indemnification arrangements, and it has not accrued any liabilities related to such obligations in its consolidated financial statements as of December 31, 2020 or 2019.

Legal Proceedings

The Company is not currently a party to any material legal proceedings. At each reporting date, the Company evaluates whether or not a potential loss amount or a potential range of loss is probable and reasonably estimable under the provisions of the authoritative guidance that addresses accounting for contingencies. The Company expenses the costs related to its legal proceedings as they are incurred.

9. 401(k) Savings Plan

The Company has a 401(k) available for participating employees who meet certain eligibility requirements. Eligible employees may defer a portion of their salary as defined by the plan. Company contributions to the plan may be made at the discretion of the board of directors of the Company. To date, the Company has not made any contributions to the plan.

10. Income Taxes

During the years ended December 31, 2020 and 2019, the Company recorded no income tax benefits for the net operating losses incurred or for the research and orphan drug tax credits generated in each year, due to its uncertainty of realizing a benefit from those items.

A reconciliation of the U.S. federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year Ended December 31,	
	2020	2019
Federal statutory income tax rate	21.0%	21.0%
State taxes, net of federal benefit	5.8	6.1
Research and orphan drug tax credits	3.4	4.1
Other	(1.7)	(1.2)
Increase in deferred tax asset valuation allowance	(28.5)	(30.0)
Effective income tax rate	— %	— %

Net deferred tax assets as of December 31, 2020 and 2019 consisted of the following (in thousands):

	December 31,	
	2020	2019
Deferred tax assets:		
Net operating loss carryforwards	$ 49,958	$ 20,836
Capitalized research and development expenses	9,506	20,723
Research and orphan drug tax credit carryforwards	9,988	7,416
Stock compensation expense	2,832	2,121
Accrued expense	828	865
Other	1,867	1,860
Total deferred tax assets	74,979	53,821
Valuation allowance	(73,600)	(52,248)
Net deferred tax assets	1,379	1,573
Deferred tax liabilities:		
Depreciation and amortization	(1,379)	(1,573)
Total deferred tax liabilities	(1,379)	(1,573)
Net deferred tax assets and liabilities	$ —	$ —

As of December 31, 2020, the Company had net operating loss carryforwards for federal income tax purposes of $182.3 million, of which $17.5 million begin to expire in 2035 and $164.8 million can be carried forward indefinitely. As of December 31, 2020, the Company had net operating loss carryforwards for state income tax purposes of $184.6 million which begin to expire in 2035. As of December 31, 2020, the Company also had available research and orphan drug tax credit carryforwards for federal and state income tax purposes of $8.4 million and $2.0 million, respectively, which begin to expire in 2035 and 2030, respectively. Utilization of the net operating loss carryforwards and research and orphan drug tax credit carryforwards may be subject to a substantial annual limitation under Section 382 of the Internal Revenue Code of 1986, as amended (the “Code”) due to ownership changes that have occurred previously or that could occur in the future. These ownership changes may limit the amount of carryforwards that can be utilized annually to offset future taxable income. The Company has not conducted a formal study to assess whether a change of control has occurred or whether there have been multiple changes of control since inception due to the significant complexity and cost associated with such a study. If the Company has experienced a change of control, as defined by Section 382 and 383 of the Code, at any time since inception, utilization of the net operating loss carryforwards or research and orphan drug tax credit carryforwards may be subject to an annual limitation under Section 382 and 383 of the Code, which is determined by first multiplying the value of the Company’s stock at the time of the ownership change by the applicable long-term tax-exempt rate, and then could be subject to additional adjustments, as required. Any limitation may result in expiration of a portion of the net operating loss carryforwards or research and orphan drug tax credit carryforwards before utilization.

The Company has evaluated the positive and negative evidence bearing upon its ability to realize the deferred tax assets. The Company considered its history of cumulative net losses incurred since inception and its lack of commercialization of any products since inception and has concluded that it is more likely than not that the Company will not realize the benefits of the deferred tax assets. Accordingly, a full valuation allowance has been established against the deferred tax assets as of December 31, 2020 and 2019. The Company reevaluates the positive and negative evidence at each reporting period.

Changes in the valuation allowance for deferred tax assets during the years ended December 31, 2020 and 2019 related primarily to the increase in net operating loss carryforwards, capitalized research and development expenses and research and orphan drug tax credit carryforwards and were as follows (in thousands):

	Year Ended December 31,	
	2020	2019
Valuation allowance as of beginning of year	$ 52,248	$ 29,243
Net increases recorded to income tax provision	21,352	23,005
Valuation allowance as of end of year	$ 73,600	$ 52,248

The Company has not recorded any amounts for unrecognized tax benefits as of December 31, 2020 or 2019.

The Company files tax returns as prescribed by the tax laws of the jurisdictions in which it operates. In the normal course of business, the Company is subject to examination by federal and state jurisdictions, where applicable. There are currently no pending income tax examinations. The Company's tax years are open under statute from 2017 to the present. The Company's policy is to record interest and penalties related to income taxes as part of its income tax provision.

11. Related Parties

National Marrow Donor Program (as successor in interest to Be The Match BioTherapies, LLC)

Effective March 2018, the President of Be The Match BioTherapies, LLC became a member of the Company's board of directors and subsequently was appointed Chief Executive Officer of the National Marrow Donor Program/Be The Match, or NMDP/Be The Match, organization in June 2020. The Company has collaboration agreements with the National Marrow Donor Program (as successor in interest to Be The Match BioTherapies, LLC) and a research agreement with an affiliated organization, Center for International Blood and Marrow Transplant Research. In addition, in June 2020, the Company entered into a clinical collaboration agreement with NMDP/Be The Match to evaluate the potential utility of MGTA-145 for mobilizing and collecting hematopoietic stem cells from donors in a single day and then using them for allogeneic transplants in patients. Under the terms of this agreement, the Company shall fund up to fifty percent of NMDP/Be The Match clinical trial costs and provide the trial drugs which will be included in research and development expense.

During each of the years ended December 31, 2020 and 2019, the Company recorded $0.4 million of expense related to these agreements. As of December 31, 2020 and 2019, amounts on the balance sheet related to these agreements was less than $0.1 million and $0.2 million, respectively, which were included in accounts payable and accrued expenses and as of December 31, 2020, less than $0.1 million was included in prepaid and other current assets.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, under the supervision and with the participation of our Principal Executive Officer (our Chief Executive Officer) and Principal Financial Officer (our Chief Financial and Operating Officer), has evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2020. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure.

Management recognizes that any disclosure controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of December 31, 2020, our Principal Executive Officer and Principal Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Internal Control Over Financial Reporting

Management's Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) under the Exchange Act. Our management conducted an assessment of the effectiveness of our internal control over financial reporting based on the criteria set forth in "Internal Control-Integrated Framework (2013)" issued by the Committee of Sponsoring Organization of the Treadway Commission. Based on this assessment, management concluded that, as of December 31, 2020, our internal control over financial reporting was effective.

This Annual Report on Form 10-K does not include an attestation report of our independent registered public accounting firm on internal control over financial reporting due to an exemption established by the JOBS Act for "emerging growth companies."

Changes in Internal Control Over Financial Reporting

No change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) occurred during the three months ended December 31, 2020 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this Item 10 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2021 Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this Item 11 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2021 Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this Item 12 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2021 Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this Item 13 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2021 Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this Item 14 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2021 Annual Meeting of Stockholders and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

1. Financial Statements

For a list of the financial statements included herein, see Index to the Consolidated Financial Statements on page 144 of this Annual Report on Form 10-K, incorporated into this Item by reference.

2. Financial Statement Schedules

Financial statement schedules have been omitted because they are either not required or not applicable or the information is included in the consolidated financial statements or the notes thereto.

3. Exhibits

The exhibits required by Item 601 of Regulation S-K and Item 15(b) of this Annual Report on Form 10-K are listed in the Exhibit Index immediately preceding the signature page of this Annual Report on Form 10-K. The exhibits listed in the Exhibit Index are incorporated by reference herein.

ITEM 16. FORM 10-K SUMMARY

None.

Exhibit Index

Exhibit Number	Description
3.1	Amended and Restated Certificate of Incorporation of the Registrant (Incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 001-38541) filed with the Securities and Exchange Commission on June 25, 2018).
3.2	Amended and Restated By-laws of the Registrant (Incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K (File No. 001-38541) filed with the Securities and Exchange Commission on June 25, 2018).
4.1	Specimen Common Stock Certificate (Incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-1/A (File No. 333-225178) filed with the Securities and Exchange Commission on June 8, 2018).
4.2	Second Amended and Restated Investors' Rights Agreement by and among the Registrant and certain of its stockholders dated April 2, 2018 (Incorporated by reference to Exhibit 4.2 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
4.3	Description of Securities of the Registrant (Incorporated by reference to Exhibit 4.3 to the Registrant's Annual Report on Form 10-K (File No. 001-38541) filed with the Securities and Exchange Commission on March 3, 2020).
10.1#	2016 Stock Option and Grant Plan, as amended, and forms of award agreements thereunder (Incorporated by reference to Exhibit 10.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.2#	2018 Stock Option and Incentive Plan and forms of award agreements thereunder (Incorporated by reference to Exhibit 10.2 to the Registrant's Registration Statement on Form S-1/A (File No. 333-225178) filed with the Securities and Exchange Commission on June 8, 2018).
10.3#	Senior Executive Cash Incentive Bonus Plan (Incorporated by reference to Exhibit 10.3 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.4#	Form of Employment Agreement (Incorporated by reference to Exhibit 10.4 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.5#	Employment Agreement by and between the Registrant and Jason Ryan, effective January 1, 2019 (Incorporated by reference to Exhibit 99.1 to the Registrant's Current Report on Form 8-K (File No. 001-38541) filed with the Securities and Exchange Commission on November 19, 2018).
10.6#	Form of Director and Officer Indemnification Agreement (Incorporated by reference to Exhibit 10.5 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.7#	2019 Employee Stock Purchase Plan (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-38541) filed with the Securities and Exchange Commission on June 11, 2019).
10.8†	License Agreement by and between the Registrant and President and Fellows of Harvard College, dated as of November 2, 2016 (Incorporated by reference to Exhibit 10.6 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).

Exhibit Number	Description
10.9†	License Agreement by and between the Registrant and Novartis International Pharmaceutical Ltd., dated as of April 3, 2017 (Incorporated by reference to Exhibit 10.7 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.10†	Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017 (Incorporated by reference to Exhibit 10.8 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.10.1†	Project Rider #2, effective as of June 26, 2018, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017 (Incorporated by reference to Exhibit 10.9.1 to the Registrant's Annual Report on Form 10-K (File No. 001-38541) filed with the Securities and Exchange Commission on March 19, 2019).
10.10.2†	Project Rider #3, effective as of September 6, 2018, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017 (Incorporated by reference to Exhibit 10.9.2 to the Registrant's Annual Report on Form 10-K (File No. 001-38541) filed with the Securities and Exchange Commission on March 19, 2019).
10.10.3	Amendment #1 to Project Rider #1, effective as of December 6, 2018, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017 (Incorporated by reference to Exhibit 10.9.3 to the Registrant's Annual Report on Form 10-K (File No. 001-38541) filed with the Securities and Exchange Commission on March 19, 2019).
10.10.4*	Amendment #2 to Project Rider #1, effective as of November 13, 2019, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017.
10.10.5*	Amendment #3 to Project Rider #1, effective as of December 16, 2020, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017.
10.10.6†	Amendment #1 to Project Rider #3, effective as of August 26, 2019, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017 (Incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-38541) filed with the Securities and Exchange Commission on November 13, 2019).
10.10.7*	Amendment #1 to Collaboration Agreement, effective as of December 31, 2020, pursuant to the Collaboration Agreement by and between the Registrant and National Marrow Donor Program d/b/a Be The Match BioTherapies, dated as of November 10, 2017.
10.11†	Clinical Trial Agreement by and between the Registrant and Regents of the University of Minnesota, dated as of January 22, 2018 (Incorporated by reference to Exhibit 10.9 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).

Exhibit Number	Description
10.12†	Master Development and Manufacturing Agreement by and between the Registrant and Bachem Americas, Inc., dated as of February 13, 2018 (Incorporated by reference to Exhibit 10.10 to the Registrant's Registration Statement on Form S-1/A (File No. 333-225178) filed with the Securities and Exchange Commission on June 18, 2018).
10.13†	Exclusive Research, Development Option and License Agreement by and between the Registrant and Heidelberg Pharma Research GmbH, dated as of March 1, 2018 (Incorporated by reference to Exhibit 10.11 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.13.1	Letter Agreement, effective as of February 28, 2019, by and between the Registrant and Heidelberg Pharma Research GmbH, relating to the Exclusive Research, Development Option and License Agreement by and between the Registrant and Heidelberg Pharma Research GmbH, dated as of March 1, 2018 (Incorporated by reference to Exhibit 10.12.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-231097) filed with the Securities and Exchange Commission on April 29, 2019).
10.13.2†	Amendment, effective as of July 4, 2019, pursuant to the Exclusive Research, Development Option and License Agreement by and between the Registrant and Heidelberg Pharma Research GmbH, dated as of March 1, 2018 (Incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-38541) filed with the Securities and Exchange Commission on November 13, 2019).
10.14	Sublease by and between the Registrant and Novartis Institutes for BioMedical Research, Inc., dated as of May 4, 2018 (Incorporated by reference to Exhibit 10.13 to the Registrant's Registration Statement on Form S-1 (File No. 333-225178) filed with the Securities and Exchange Commission on May 24, 2018).
10.14.1	First Amendment to Sublease Agreement, dated as of December 13, 2018, by and between the Registrant and Novartis Institutes for BioMedical Research, Inc. (Incorporated by reference to Exhibit 10.14.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-231097) filed with the Securities and Exchange Commission on April 29, 2019).
10.14.2*	Second Amendment to Sublease Agreement, dated as of August 19, 2020, by and between the Registrant and Novartis Institutes for BioMedical Research, Inc.
10.15#	First Amendment to Employment Agreement, executed as of October 14, 2020, by and between the Registrant and John C. Davis, Jr., M.D. (Incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-38541) filed with the Securities and Exchange Commission on November 5, 2020).
21.1*	List of Subsidiaries of the Registrant.
23.1*	Consent of KPMG LLP, independent registered public accounting firm.
24.1*	Power of Attorney (included on signature page to this Annual Report on Form 10-K).
31.1*	Certification of Principal Executive Officer pursuant to Rules 13a-14(a) or 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of Principal Financial Officer pursuant to Rules 13a-14(a) or 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certifications of the Principal Executive Officer and Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

Exhibit Number	Description
104*	Cover Page Interactive Data File (formatted as Inline XBRL with applicable taxonomy extension information contained in Exhibits 101.*)
101INS*	Inline XBRL Instance Document.
101SCH*	Inline XBRL Taxonomy Extension Schema Document.
101CAL*	Inline XBRL Taxonomy Extension Calculation Linkbase Document.
101LAB*	Inline XBRL Taxonomy Extension Labels Linkbase Document.
101PRE*	Inline XBRL Taxonomy Extension Presentation Linkbase Document.
101DEF*	Inline XBRL Taxonomy Extension Definition Linkbase Document.

* Filed herewith.
** Furnished herewith.
# Represents management compensation plan, contract or arrangement.
† Application has been made to the Securities and Exchange Commission for confidential treatment of certain provisions. Omitted material for which confidential treatment has been requested has been filed separately with the Securities and Exchange Commission.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

MAGENTA THERAPEUTICS, INC.

Date: March 3, 2021

By: /s/ Stephen Mahoney
Stephen Mahoney
Chief Financial and Operating Officer
(Principal Financial and Accounting Officer)

POWER OF ATTORNEY

Each person whose individual signature appears below hereby authorizes and appoints Jason Gardner and Stephen Mahoney, 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, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Jason Gardner, D.Phil. Jason Gardner, D.Phil.	President, Chief Executive Officer and Director (Principal Executive Officer)	March 3, 2021
/s/ Stephen Mahoney Stephen Mahoney	Chief Financial and Operating Officer (Principal Financial and Accounting Officer)	March 3, 2021
/s/ Jeffrey Albers Jeffrey Albers	Director	March 3, 2021
/s/ Michael W. Bonney Michael W. Bonney	Director	March 3, 2021
/s/ Bruce Booth, D.Phil. Bruce Booth, D.Phil.	Director	March 3, 2021
/s/ Alexis A. Borisy Alexis A. Borisy	Director	March 3, 2021
/s/ Blake Byers, Ph.D Blake Byers, Ph.D	Director	March 3, 2021
/s/ Thomas O. Daniel, M.D. Thomas O. Daniel, M.D.	Director	March 3, 2021
/s/ Alison F. Lawton Alison F. Lawton	Director	March 3, 2021
/s/ Anne M. McGeorge Anne M. McGeorge	Director	March 3, 2021
/s/ Amy L. Ronneberg Amy L. Ronneberg	Director	March 3, 2021
/s/ David T. Scadden, M.D. David T. Scadden, M.D.	Director	March 3, 2021

AMENDMENT #2
TO
PROJECT RIDER #1

COLLABORATION AGREEMENT

This Amendment #2 to Project Rider #1 ("**Amendment #2**") is entered into effective as of the date of the final signature executing this Amendment #2 ("**Amendment #2 Effective Date**") by and between Magenta Therapeutics, Inc. ("**Magenta**") and **National Marrow Donor Program d/b/a Be The Match Biotherapies** ("**BTMB**") (each a "**Party**" and collectively the "**Parties**").

WHEREAS, the Parties executed a Collaboration Agreement, effective November 10, 2017 and a Project Rider, effective December 6, 2017 (as amended by that certain Amendment #1, effective December 6, 2018, "**Project Rider #1**"); and

WHEREAS, the Parties agree to revise the Payment Schedule of the Project Rider #1.

NOW, THEREFORE, for the valuable consideration contained herein, and intending to be legally bound, Magenta and BTMB agree to the following amendment to be effective as of the Amendment #2 Effective Date as follows:

Amendment to Project Rider #1

1. Delete the Payment Schedule in **Section D. Compensation of BTMB** of Project Rider #1 in its entirety and replace it with the following to read as follows:

PAYMENT SCHEDULE

For Services provided by BTMB during Calendar Year 2020 (January 1, 2020 through December 31, 2020), Magenta will pay BTMB a fixed price quarterly payment of $25,000.	BTMB will invoice $25,000 every January 15th for consulting services occurring during the period commencing January 1st and ending March 31st. BTMB will invoice $25,000 every April 15th for consulting services commencing April 1st and ending June 30th. BTMB will invoice $25,000 every July 15th for consulting services commencing July 1st and ending September 30th. BTMB will invoice $25,000 every October 15th for consulting services commencing October 1st and ending December 31st.

[Remainder of page intentionally left blank.]

This Amendment #2 is executed by individuals who are duly authorized to legally bind their respective parties as of the Amendment #2 Effective Date:

MAGENTA THERAPEUTICS, INC.

By: /s/ Christina Isacson
Authorized signature

Christina Isacson
(Typed/Printed Name)

Title: Chief Business Officer
Date: November 13, 2019

NATIONAL MARROW DONOR PROGRAM d/b/a BE THE MATCH BIOTHERAPIES

By: /s/ Mary Frey
Authorized signature

Mary Frey
(Typed/Printed Name)

Title: Contracts & Procurement Department
Date: 11/12/19

AMENDMENT #3
TO
PROJECT RIDER #1

COLLABORATION AGREEMENT

This Amendment #3 to Project Rider #1 ("**Amendment #3**") is entered into effective as of the date of the final signature executing this Amendment #3 ("**Amendment #3 Effective Date**") by and between Magenta Therapeutics, Inc. ("**Magenta**") and **National Marrow Donor Program d/b/a Be The Match Biotherapies** ("**BTMB**") (each a "Party" and collectively the "**Parties**").

WHEREAS, the Parties executed a Collaboration Agreement, effective November 10, 2017 and a Project Rider, effective December 6, 2017 (as amended by that certain Amendment #1, effective December 6, 2018 and Amendment #2, effective November 13, 2019, "**Project Rider #1**"); and

WHEREAS, the Parties agree to extend the Term and Payment Schedule of the Project Rider #1.

NOW, THEREFORE, for the valuable consideration contained herein, and intending to be legally bound, Magenta and BTMB agree to the following amendment as follows:

Amendment to Project Rider #1

1. Delete the Payment Schedule in **Section D. Compensation of BTMB** of Project Rider #1 in its entirety and replace it with the following to read as follows:

PAYMENT SCHEDULE

For Services provided by BTMB during Calendar Year 2021 (January 1, 2021 through December 31, 2021), Magenta will pay BTMB a fixed price quarterly payment of $17,500.	BTMB will invoice $17,500 every January 15th for consulting services occurring during the period commencing January 1st and ending March 31st. BTMB will invoice $17,500 every April 15th for consulting services commencing April 1st and ending June 30th. BTMB will invoice $17,500 every July 15th for consulting services commencing July 1st and ending September 30th. BTMB will invoice $17,500 every October 15th for consulting services commencing October 1st and ending December 31st.

2. Delete Section E. TERM. of Project Rider #1 in its entirety and replace it with the following to read as follows:

E. TERM. The term of this Rider shall commence on the Rider effective date set forth above and continue and remain in effect through December 31, 2021.

[Remainder of page intentionally left blank.]

This Amendment #3 is executed by individuals who are duly authorized to legally bind their respective parties as of the Amendment #3 Effective Date:

MAGENTA THERAPEUTICS, INC.

By: /s/ Christina Isacson
Authorized signature

Christina Isacson
(Typed/Printed Name)

Title: Chief Business Officer

Date: 12/16/20

NATIONAL MARROW DONOR PROGRAM d/b/a BE THE MATCH BIOTHERAPIES

By: /s/ Mary Frey
Authorized signature

Mary Frey
(Typed/Printed Name)

Title: Contracts & Procurement Director

Date: 12/7/2020

AMENDMENT #1

COLLABORATION AGREEMENT

This Amendment #1 ("**Amendment #1**") is issued pursuant to the Collaboration Agreement ("**Agreement**"), effective November 10, 2017, between Magenta Therapeutics, Inc. ("**Magenta**") and National Marrow Donor Program d/b/a Be The Match BioTherapies ("**BTMB**") and incorporates all of the terms and conditions therein. The effective date of this Amendment shall be December 31, 2020.

The Parties agree to extend the term under the Agreement as follows:

Replace Section 2. Term in its entirety to read as follows:

> **2. Term.** The term of this Agreement shall commence on the effective date set forth above and continue and remain in effect until December 31, 2022 or until this Agreement is terminated as provided for in Section 9, "Termination".

Except as provided above, all other terms and conditions in the Agreement remain unchanged and in full force and effect. This Amendment #1 is executed by individuals who are authorized to bind their respective parties.

NATIONAL MARROW DONOR PROGRAM d/b/a BE THE MATCH BIOTHERPAIES	**MAGENTA THERAPEUTICS, INC.**
By: /s/ Mary Frey Authorized signature	By: /s/ Christina Isacson Authorized signature
Mary Frey (Typed/Printed Name)	Christina Isacson (Typed/Printed Name)
Title: Contracts & Procurement Director	Title: Chief Business Officer
Date: 12/7/2020	Date: 12/14/2020

Exhibit 10.14.2

SECOND AMENDMENT TO SUBLEASE AGREEMENT

This **SECOND AMENDMENT TO SUBLEASE AGREEMENT** (this "Second Amendment") is dated as of August 19, 2020 (the "Effective Date") by and between **NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH, INC.**, a Delaware corporation, having an address at 100 Technology Square, Cambridge Massachusetts 02139 ("Novartis"), and **MAGENTA THERAPEUTICS, INC.,** a Delaware corporation, having an address at 50 Hampshire Street, 8th Floor, Cambridge Massachusetts 02139 ("Subtenant").

Background

A. Pursuant to a Lease, dated as of April 25, 2002, between ARE- Tech Square, LLC, as successor in interest to Massachusetts Institute of Technology ("Overlandlord"), as landlord, and Novartis, as tenant, Overlandlord demised and let unto Novartis, and Novartis did hire and take from Overlandlord, the entire building known by the street address of 100 Technology Square, Cambridge Massachusetts (the "Building"), on the terms and subject to the conditions set forth therein as amended by the First Amendment To Lease dated as of May 3, 2005, Second Amendment to Lease dated as of June 24, 2010, Third Amendment To Lease date January 31, 2017, and Fourth Amendment To Lease dated as of May 14, 2018 (said Lease, as so amended, being referred to herein as the "Overlease"); and

B. Pursuant to the terms of that certain Sublease dated as of May 4, 2018 between Novartis, as sublandlord, and Subtenant, as subtenant, as modified by that certain First Amendment To Sublease Agreement dated as of December 13, 2018 (collectively the "Original Sublease"), Novartis subleased the entire fifth (5th) Floor and the entire sixth (6th) Floor of the Building to Subtenant (the "Sublease Premises").

C. Novartis and Subtenant desire to amend the Original Sublease in accordance with the terms of this Second Amendment.

Agreement

NOW, THEREFORE, in consideration of the covenants and conditions hereinafter set forth and for other good and valuable consideration, Novartis and Subtenant do hereby mutually covenant and agree as follows:

1. Definitions. Capitalized terms used in this Second Amendment and not otherwise defined herein shall have the meanings assigned to them in the Original Sublease. The Original Sublease as amended by this Second Amendment is hereafter referred to as the "Sublease."

2. Amendments. The Sublease is amended as follows:

(a) As of the Effective Date, the parties hereby agree that (i) the second (2nd) grammatical sentence in Section 6(a)(i) of the Original Sublease, beginning "Provided, however, no Space User shall be permitted..." shall hereafter be deleted and of no further force and effect. The parties acknowledge those Space Users existing in portions of the Sublease Premises as of the Effective Date, namely Cellarity, Inc. (f/k/a: VL49, Inc.) and

AvroBio, Inc., shall be entitled to extend their sub-subleases of those portions of the Sublease Premises that each occupies, pursuant to a sub-sublease agreement, and that the Initial Sublet/License Period shall be extended for any period up to and including April 30, 2022.

(b) As of the Effective Date, Subtenant agrees that Novartis has satisfied all of its obligations under Section 15(e) of the Original Sublease (as modified by the First Amendment) including, without limitation, the obligation to pay the Sublet Improvement Allowance to Subtenant in full and that Novartis has no further liabilities or obligations to Subtenant under Section 15(e) of the Original Sublease (as modified by the First Amendment).

3. General Provisions.

(a) Governing Law. The exercise, validity, construction, operation and effect of the terms and provisions of this Second Amendment to Sublease Agreement shall be determined and enforced in accordance with the laws of the Commonwealth of Massachusetts applicable to agreements made and to be performed in the Commonwealth of Massachusetts. IN ANY ACTION OR PROCEEDING ARISING HEREFROM, NOVARTIS AND SUBTENANT HEREBY BY CONSENT TO: (A) THE JURISDICTION OF ANY FEDERAL, STATE, COUNTY OR MUNICIPAL COURT SITTING IN THE COMMONWEALTH OF MASSACHUSETTS; (B) SERVICE OF PROCESS BY ANY MEANS AUTHORIZED BY MASSACHUSETTS LAW; AND (C) IN THE INTEREST OF SAVING TIME AND EXPENSE, TRIAL WITHOUT A JURY IN ANY ACTION, PROCEEDING OR COUNTERCLAIM BROUGHT BY EITHER OF THE PARTIES HERETO AGAINST THE OTHER OR THEIR SUCCESSORS IN RESPECT OF ANY MATTER ARISING OUT OF OR IN CONNECTION WITH THIS SUBLEASE, THE RELATIONSHIP OF NOVARTIS AND SUBTENANT, SUBTENANT'S USE OR OCCUPANCY OF THE SUBLEASE PREMISES, AND/OR ANY CLAIM FOR INJURY OR DAMAGE, OR ANY EMERGENCY OR STATUTORY REMEDY.

(b) Authority. The parties hereto represent and warrant to each other that each has full right and authority to enter into this Second Amendment and that the person signing this Second Amendment on behalf of each has the requisite authority for such act.

(c) Entire Agreement. This Second Amendment constitutes the entire agreement between the parties hereto and may not be modified except by a written instrument executed by the parties hereto.

(d) Captions. Paragraph headings are used herein solely for reference purposes and are not to be construed as part of this Second Amendment.

(e) Counterparts and Execution. This Second Amendment may be executed and delivered in several counterparts, each of which, when so executed and delivered, shall constitute an original, fully enforceable counterpart for all purposes. To facilitate execution of this Second Amendment, the parties hereto may execute and exchange, by electronic mail PDF, counterparts of the signature pages. Signature pages may be detached from the counterparts and attached to a single copy of this Second Amendment to physically form one document. Each individual executing this Second Amendment on behalf of Novartis or Subtenant represents and warrants that he or she has been duly authorized to do so.

(f) Subordination to Prime Lease.

This Second Amendment to Sublease is and shall be expressly subject and subordinate to all of the terms, provisions, covenants, agreements and conditions of the Overlease. This Second Amendment to Sublease is also subject and subordinate to all instruments, agreements and other matters to which the Overlease is or shall be subject or subordinate.

(g) Full Force and Effect. Except as expressly modified herein or inconsistent with the terms hereof, the Sublease shall remain in full force and effect and all of the provisions thereof are hereby ratified and confirmed.

(h) Broker. Novartis and Subtenant each represents to the other that it has not dealt with any brokers or agents with respect to this Second Amendment to Sublease and each shall indemnify and hold harmless the other from and against any and all liabilities, claims, suits, demands, judgments, costs and expenses to which it may be subject or suffer by reason of any claim made by any person, firm or corporation for any commission, expense or other compensation as a result of the execution and delivery of this Second Amendment to Sublease and based on alleged conversations or negotiations by said person, firm or corporation with either Novartis or Subtenant, as the case may be.

[The remainder of this page intentionally left blank.]

IN WITNESS WHEREOF, Novartis and Subtenant have executed this Second Amendment to Sublease Agreement as of the day and year first above written.

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH, INC.,
A Delaware Corporation

By: /s/ Revathi Rommohan
Name: Revathi Rommohan
Title: Chief Financial Officer
20-Aug-20 | 7:16:07 PM GMT

MAGENTA THERAPEUTICS, INC.,
A Delaware corporation

By: /s/ Jason Gardner
Name: Jason Gardner
Title: CEO Magenta
19-Aug-20 | 6:34:31 PM EDT

Exhibit 21.1

Legal Name	State of Organization
Magenta Securities Corporation	Massachusetts

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

The Board of Directors
Magenta Therapeutics, Inc.:

We consent to the incorporation by reference in the registration statement (No. 333-233127) on Form S-3 and (No. 333-225838, No. 333-230387, No. 333-233125 and No. 333-236853) on Form S-8 of Magenta Therapeutics, Inc. and subsidiary, of our report dated March 3, 2021, with respect to the consolidated balance sheets of Magenta Therapeutics, Inc. as of December 31, 2020 and 2019, and the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for the years then ended, and the related notes, which report appears in the December 31, 2020 annual report on Form 10-K of Magenta Therapeutics, Inc.

/s/ KPMG LLP

Boston, Massachusetts
March 3, 2021

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO RULE 13A-14(A) / RULE 15D-14(A) OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Jason Gardner, D.Phil., certify that:

1. I have reviewed this Annual Report on Form 10-K of Magenta Therapeutics, 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: March 3, 2021

/s/ Jason Gardner

Jason Gardner, D.Phil.
President, Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO
RULE 13A-14(A) / RULE 15D-14(A) OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Stephen Mahoney, certify that:

1. I have reviewed this Annual Report on Form 10-K of Magenta Therapeutics, 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: March 3, 2021

/s/ Stephen Mahoney
Stephen Mahoney
Chief Financial and Operating Officer
(Principal Financial and Accounting Officer)

Exhibit 32.1

CERTIFICATIONS OF PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with this Annual Report on Form 10-K of Magenta Therapeutics, Inc. (the "Company") for the fiscal year ended December 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of his or her knowledge:

1. the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 3, 2021

/s/ Jason Gardner
Jason Gardner, D.Phil.
President and Chief Executive Officer
(Principal Executive Officer)

/s/ Stephen Mahoney
Stephen Mahoney
Chief Financial and Operating Officer
(Principal Financial and Accounting Officer)