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, 2019

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: 0-20859

GERON CORPORATION
(Exact name of registrant as specified in its charter)

Delaware	**75-2287752**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
149 Commonwealth Drive, Suite 2070, Menlo Park, CA	**94025**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (650) 473-7700

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	GERN	The Nasdaq Stock Market LLC

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

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 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 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 is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of voting and non-voting common equity held by non-affiliates of the registrant was approximately $262,459,000 based upon the closing price of the registrant's common stock on June 28, 2019 on the Nasdaq Global Select Market. The calculation of the aggregate market value of voting and non-voting common equity held by non-affiliates of the registrant excludes shares of common stock held by each officer, director and stockholder that the registrant concluded were affiliates on that date. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of March 2, 2020, there were 200,344,809 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE:

Document	**Form 10-K Parts**
Portions of the Registrant's definitive proxy statement for the 2020 annual meeting of stockholders to be filed pursuant to Regulation 14A within 120 days of the Registrant's fiscal year ended December 31, 2019	III

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In this report, unless otherwise indicated or the context otherwise requires, "Geron," "the registrant," "we," "us," and "our" refer to Geron Corporation, a Delaware corporation.

Forward-Looking Statements

This annual report on Form 10-K, including "Business" in Part I, Item 1 and "Management's Discussion and Analysis of Financial Condition and Results of Operations" in Part II, Item 7, contains forward-looking statements that involve risks and uncertainties, as well as assumptions that, if they never materialize or prove incorrect, could cause the results of Geron Corporation, or Geron or the Company, to differ materially from those expressed or implied by such forward-looking statements. All statements other than statements of historical fact are statements that could be deemed forward-looking statements. In some cases, forward-looking statements can be identified by the use of terminology such as "may," "expects," "plans," "intends," "will," "should," "projects," "believes," "predicts," "anticipates," "estimates," "potential," or "continue" or the negative thereof or other comparable terminology. The risks and uncertainties referred to above include, without limitation, risks related to uncertainty of non-clinical and clinical trial results or regulatory approvals or clearances, the future development of imetelstat, including any future efficacy or safety results that may cause the benefit-risk profile of imetelstat to become unacceptable, our need for additional capital to support the development and commercialization of imetelstat and to otherwise grow our business, transition of the imetelstat program to us, establishing and maintaining imetelstat manufacture and supply, enforcement of our patent and proprietary rights, managing our business growth, litigation risks, the effects of any health epidemics, potential competition and other risks that are described herein and that are otherwise described from time to time in our Securities and Exchange Commission reports including, but not limited to, the factors described in Part I, Item 1A, "Risk Factors," of this annual report on Form 10-K. Geron assumes no obligation for and except as required by law, disclaims any obligation to update these forward-looking statements to reflect future information, events or circumstances.

Calculation of Aggregate Market Value of Non-Affiliate Shares

For purposes of calculating the aggregate market value of shares of our common stock held by non-affiliates as set forth on the cover page of this annual report on Form 10-K, we have assumed that all outstanding shares are held by non-affiliates, except for shares held by each of our executive officers, directors and 5% or greater stockholders. In the case of 5% or greater stockholders, we have not deemed such stockholders to be affiliates unless there are facts and circumstances which would indicate that such stockholders exercise any control over our Company. These assumptions should not be deemed to constitute an admission that all executive officers, directors and 5% or greater stockholders are, in fact, affiliates of our Company, or that there are no other persons who may be deemed to be affiliates of our Company. Further information concerning shareholdings of our executive officers, directors and principal stockholders is incorporated by reference in Part III, Item 12 of this annual report on Form 10-K.

PART I

ITEM 1. BUSINESS

Company Overview

We are a late-stage clinical biopharmaceutical company that is focused on the development and potential commercialization of imetelstat, an innovative therapeutic for hematologic myeloid malignancies. We have global rights to imetelstat, a first-in-class telomerase inhibitor, which was discovered and developed at Geron. We believe targeting telomerase has the potential to inhibit the uncontrolled proliferation of malignant progenitor cells in hematologic myeloid malignancies to reduce dysfunctional blood cell production and enable recovery of normal blood cell production. Data reported from our Phase 2/3 clinical trial in lower risk myelodysplastic syndromes, or MDS, indicate imetelstat may induce meaningful and durable transfusion independence and increases in hemoglobin levels, suggesting potential recovery of normal blood cells occurring in the bone marrow, or hematopoiesis. In addition, data reported from our Phase 2 clinical trial in relapsed/refractory myelofibrosis, or MF, suggest imetelstat potentially improves overall survival, or OS, in MF. We believe these data, taken together, suggest potential disease-modifying activity from imetelstat treatment.

Imetelstat has been granted both Orphan Drug and Fast Track designations by the United States Food and Drug Administration, or FDA, for the treatment of patients with Low or Intermediate-1 risk MDS, or lower risk MDS, and for the treatment of patients with Intermediate-2 or High-risk MF relapsed after or refractory to janus kinase inhibitor treatment, or relapsed/refractory MF.

Myelodysplastic Syndromes (MDS)

We are currently conducting IMerge, our Phase 2/3 clinical trial in lower risk MDS. The ongoing Phase 3 portion of IMerge is a randomized and placebo-controlled trial that, based on discussions with United States, or U.S., and European regulatory authorities, we expect will support, if successful, the registration of imetelstat in lower risk MDS. Many key aspects from the Phase 2 portion of IMerge remained the same for the Phase 3 portion, including the primary and secondary endpoints, the dose and schedule of imetelstat administration, and patient eligibility criteria. We expect the Phase 3 trial to be conducted at multiple medical centers globally, including North America, Europe, Middle East and Asia. As of the end of February 2020, approximately 63% of the planned sites were opened for enrollment. The Phase 3 portion of IMerge opened to new patient enrollment in August 2019 and the first patient was dosed in October 2019. We plan to complete patient enrollment in the Phase 3 portion of IMerge by the end of 2020 and expect top-line results by mid-year 2022.

The Phase 2 portion of IMerge is closed to enrollment, and patients remaining in the treatment phase continue to receive imetelstat treatment. We expect more mature data, including treatment and follow-up, from the patients remaining in the Phase 2 portion of IMerge to be available in 2020 and expect to present such data at a future medical conference in 2020.

Myelofibrosis (MF)

In the fourth quarter of 2019, we conducted an End of Phase 2 meeting with the FDA to discuss the results of IMbark, our Phase 2 clinical trial in relapsed/refractory MF. Based on feedback from the meeting, we plan to submit Phase 3 trial design proposals in MF to the FDA, and, in the second quarter of 2020, to have further discussions with the FDA regarding a potential regulatory approval path, if any, for imetelstat in MF. Subsequent to these additional discussions, and after considering the timing and resources required, as well as other clinical development opportunities for imetelstat, we plan to make a decision regarding potential late-stage development of imetelstat in MF by mid-year 2020.

In February 2020, we closed IMbark, our Phase 2 clinical trial in relapsed/refractory MF, since we believe we have obtained sufficient data from the trial to support potential late-stage development in MF. As of the end of February 2020, no further follow-up of remaining patients is being conducted.

Other Indications

In 2020, we plan to expand the imetelstat program through the commencement of a potential proof-of-concept study in Intermediate-2 or High-risk, or higher risk, MDS and acute myeloid leukemia and expect to commence such a study by the end of the fourth quarter of 2020.

Recent Data from IMerge (Ongoing Phase 2/3 Trial in Lower Risk MDS)

In June 2019, we reported updated results from the Phase 2 portion of IMerge in which 42% of patients experienced red blood cell transfusion independence for at least 8 consecutive weeks, or an 8-week RBC-TI rate. Importantly, this 8-week RBC-TI rate was observed in patients with red blood cell transfusion burdens of greater than or equal to four units per eight weeks prior to starting treatment with imetelstat. Higher transfusion burdens are considered an indicator of a more difficult to treat patient population. Patients enrolled in the Phase 2 portion of IMerge had a baseline median red blood cell transfusion burden of eight units per eight weeks with a range of four to 14 units. Our results compare favorably to currently used treatments in a similar patient population. Hypomethylating agents, or HMAs, and lenalidomide have been used to improve anemia, but with limited success, such as reported 8-week RBC-TI rates of 17% for azacitidine, an HMA, and 27% for lenalidomide. In addition, 29% of patients in the Phase 2 portion of IMerge experienced a durable response, as reflected by achieving a 24-week RBC-TI, and 75% of patients who achieved an 8-week RBC-TI reported a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval. We believe these data indicate potential recovery of normal hematopoiesis and suggest potential disease-modifying activity of imetelstat treatment for these patients.

Recent Data from IMbark (Closed Phase 2 Trial in Relapsed/Refractory MF)

Also in June 2019, an analysis was presented of the OS in relapsed/refractory MF patients treated with imetelstat 9.4 mg/kg in IMbark, compared to OS calculated from real world data, or RWD, collected at the Moffitt Cancer Center for patients who had discontinued treatment with ruxolitinib, a janus kinase, or JAK, inhibitor, and who were subsequently treated with best available therapy, or BAT. To make a comparison between the IMbark data and RWD, a cohort from the real-world dataset was identified that closely matched the IMbark patients, using guidelines for inclusion and exclusion criteria as defined in the IMbark clinical protocol, such as platelet count and spleen size. Calculations from two propensity score analysis approaches resulted in a median OS of 30.7 months for the imetelstat-treated patients from IMbark, which is more than double the median OS of 12.0 months using RWD for patients treated with BAT. These analyses also indicated a 65-67% lower risk of death for the imetelstat-treated patients vs. BAT-treated patients. We believe these analyses suggest favorable OS for imetelstat-treated relapsed/refractory MF patients, compared to BAT in closely-matched patients from RWD.

In February 2020, we closed IMbark since we believe we have obtained sufficient data from the trial to support potential late-stage development of imetelstat in MF. As of the end of February 2020, no further follow-up of remaining patients is being conducted.

Transition of Imetelstat Program to Geron

As of the end of September 2019, the transition of the imetelstat program to us from our former collaboration partner, Janssen Biotech, Inc., or Janssen, was completed. See the section entitled “Status of Former Collaboration Agreement with Janssen” below for further information.

Financial Resources and Plan for Potential Commercialization

We had approximately $159.2 million in cash, cash equivalents, restricted cash and current and noncurrent marketable securities as of December 31, 2019, which we believe is sufficient to continue the IMerge Phase 2/3 trial through 2020 and to commence a proof-of-concept study in additional hematologic myeloid malignancies in 2020. We will require substantial additional capital in order to further advance the imetelstat program, including conducting the research and development, clinical, regulatory and potential commercialization activities necessary to bring imetelstat to market. In this regard, our ability to complete the Phase 3 portion of IMerge and to commence, conduct and complete potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF or potential additional proof-of-concept studies in other hematologic myeloid malignancies, is dependent on our ability

to raise substantial additional capital. In addition, our ability to commercialize imetelstat in the United States, if regulatory approval is granted, depends on us being able to establish sales and marketing capabilities. If approved for marketing by regulatory authorities, we plan to commercialize imetelstat in the United States and seek potential commercialization partners for territories outside of the United States.

We hold issued patents covering imetelstat composition of matter. In the United States, our composition of matter patent coverage extends through 2025. In Europe, our composition of matter patent coverage expires in 2024, and includes patent rights in Germany, France, the United Kingdom, and other member countries of the European Patent Convention. In Japan, our composition of matter patent coverage expires in 2024. Potential five-year patent term extensions may also be available in the United States and Europe, which could extend patent terms in these jurisdictions to 2030 in the United States and 2029 in Europe and Japan, respectively. In some countries, such as the United States, the scope of protection under such patent term extensions, if any, would be defined by the scope of the imetelstat composition of matter as approved. In addition, we have issued patents pertaining to methods of use that extend patent coverage into 2033. The issued U.S. patent covers the treatment of both MF and MDS with imetelstat. The issued European patent covers the treatment of MF with imetelstat. Also, we have received orphan drug designations for both MDS and MF in the United States and for MF in Europe. Orphan drug designation in the United States allows for market exclusivity for up to seven years. Orphan drug designation in Europe allows for market exclusivity for up to ten years.

Telomerase: Scientific Rationale

Telomeres and Telomerase in Normal Development

In the human body, normal growth and maintenance of tissues occurs by cell division. However, most cells are only able to divide a limited number of times, and this number of divisions is regulated by telomere length. Telomeres are repetitions of a deoxyribonucleic acid, or DNA, sequence located at the ends of chromosomes. They act as protective caps to maintain stability and integrity of the chromosomes, which contain the cell's genetic material. Normally, every time a cell divides, the telomeres shorten. Eventually, they shrink to a critically short length, and as a result, the cell either dies by apoptosis or stops dividing and senesces.

Telomerase is a naturally occurring enzyme that maintains telomeres and prevents them from shortening during cell division, such as stem cells that must remain immortalized to support normal health. Telomerase consists of at least two essential components: a ribonucleic acid, or RNA, template (hTR), which binds to the telomere, and a catalytic subunit (human telomerase reverse transcriptase, or hTERT) with reverse transcriptase activity, which adds a specific DNA sequence to the chromosome ends. The 2009 Nobel Prize for Physiology or Medicine was awarded to Drs. Elizabeth H. Blackburn, Carol W. Greider and Jack Szostak, former Geron collaborators, for the discovery of how chromosomes are protected by both telomeres and telomerase.

Telomerase is active during embryonic development, enabling the rapid cell division that supports normal growth. During the latter stages of human fetal development and in adulthood, telomerase is repressed in most cells, and telomere length gradually decreases during a lifetime. In tissues that have a high turnover throughout life, such as blood and gut, telomerase can be transiently upregulated in progenitor cells to enable controlled, self-limited proliferation to replace cells lost through natural cell aging processes. As the progeny of progenitor cells mature, telomerase is downregulated and telomeres shorten with cell division, preventing uncontrolled proliferation.

Telomeres and Telomerase in Cancer

Telomerase is upregulated in many tumor progenitor cells, enabling the continued and uncontrolled proliferation of the malignant cells that drive tumor growth and progression. Telomerase expression has been found to be present in approximately 90% of biopsies taken from a broad range of human cancers. Our non-clinical studies, in which the telomerase gene was artificially introduced and expressed in normal cells grown in culture, have suggested that telomerase does not itself cause a normal cell to become malignant. Instead, the sustained upregulation of telomerase enables tumor cells to maintain telomere length, providing them with the capacity for limitless proliferation. We believe that the sustained upregulation of telomerase is critical for tumor progression as it enables malignant progenitor cells to acquire cellular immortality and avoid apoptosis, or cell death.

Telomerase Inhibition and Hematologic Malignancies: Inducing Cancer Cell Death

We believe that inhibiting telomerase may be an attractive approach to treating cancer because it may limit the proliferative capacity of malignant progenitor cells, which are believed to be important drivers of tumor growth and progression. We and others have observed in various in vitro and rodent tumor models that inhibiting telomerase results in telomere shortening and arrests uncontrolled malignant cell proliferation and tumor growth.

Hematologic malignancies, or blood cancers, are classified according to the precursor cell type. A hematologic myeloid malignancy is a cancer that occurs in the hematopoietic myeloid progenitor cells, such as the precursor cells of red blood cells, platelets and certain myeloid white blood cells, such as granulocytes. Myeloid neoplasms include myeloproliferative neoplasms, MDS and acute myeloid leukemia, or AML. Examples of myeloproliferative neoplasms include chronic myeloid leukemia, essential thrombocythemia, or ET, polycythemia vera and MF. These myeloid neoplasms are different from lymphocytic malignancies which typically occur in the lymphoid cell progenitor lineage, such as precursor cells of T lymphocytes and B lymphocytes. Examples of lymphoid malignancies include acute lymphoblastic leukemia, chronic lymphocytic leukemia, lymphomas and multiple myeloma.

Many hematologic myeloid malignancies, such as ET, MF, and MDS, have been shown to arise from malignant progenitor cells that express higher telomerase activity and have shorter telomeres when compared to normal healthy cells. In vitro studies have suggested that tumor cells with short telomeres may be especially sensitive to the anti-proliferative effects of inhibiting telomerase.

Imetelstat: The First Telomerase Inhibitor to Advance to Clinical Development

Imetelstat is a lipid conjugated 13-mer oligonucleotide that we designed to be complementary to and bind with high affinity to the RNA template of telomerase, thereby directly inhibiting telomerase activity. Imetelstat does not elicit its effect through an antisense inhibition of protein translation. The compound has a proprietary thio-phosphoramidate backbone, which is designed to provide resistance to the effect of cellular nucleases, thus conferring improved stability in plasma and tissues, as well as improved binding affinity to its target. To improve the ability of imetelstat to penetrate cellular membranes, we conjugated the oligonucleotide to a lipid group. Imetelstat's IC50, or half maximal inhibitory concentration, is 0.5 – 10 nM in cell free assays. Single-dose kinetics in patients has shown dose-dependent increases in exposure to imetelstat, with a plasma half-life, which is the time it takes for the concentration or amount of imetelstat to be reduced by half, ranging from 4 – 5 hours. Data from animal studies and clinical trials have suggested that the residence time of imetelstat in bone marrow is long, with 0.19 – 0.51 μM observed at 41 – 45 hours after a 7.5 mg/kg dose in patients. Imetelstat also has been shown in non-clinical studies to exhibit relatively preferential inhibition of the clonal proliferation of malignant progenitor cells compared to normal progenitor cells. For these reasons, imetelstat has been studied as a potential treatment for malignant diseases.

Imetelstat is the first telomerase inhibitor to advance to clinical development. The Phase 1 trials that we completed evaluated the safety, tolerability, pharmacokinetics and pharmacodynamic effects of imetelstat. We established doses and dosing schedules that were tolerable and achieved target exposures in patients that were consistent with those required for efficacy in animal models. Following intravenous administration of imetelstat using tolerable dosing regimens, clinically relevant and significant inhibition of telomerase activity was observed in various types of tissue in which telomerase activity is measurable, including normal bone marrow hematopoietic cells, malignant plasma cells, hair follicle cells and peripheral blood mononuclear cells. Dose-limiting toxicities included thrombocytopenia, or reduced platelet count, and neutropenia, or reduced neutrophil count.

Proof-of-Concept of Imetelstat's Disease-Modifying Potential

We believe that imetelstat may have the potential to suppress the proliferation of malignant progenitor cell clones to allow recovery of normal hematopoiesis in patients with hematologic myeloid malignancies. Early clinical data from a Phase 2 trial of imetelstat in patients with ET, or the ET Trial, and a pilot study of imetelstat in patients with MF conducted at Mayo Clinic, or the Pilot Study, suggest imetelstat inhibits the progenitor cells of the malignant clones believed to be responsible for the underlying diseases in a relatively select manner indicating

potential disease-modifying activity. These data were published in two separate articles in a September 2015 issue of *The New England Journal of Medicine*.

Reported adverse events, or AEs, and laboratory investigations associated with imetelstat in the ET Trial and the Pilot Study included cytopenias, gastrointestinal symptoms, constitutional symptoms, and hepatic biochemistry abnormalities. Dose-limiting toxicities, such as profound and prolonged thrombocytopenia and neutropenia, and other safety issues, including death, were observed in the ET Trial and the Pilot Study. In those trials, such myelosuppression was managed by dose holds and modification rules.

Lead Clinical Indication in Clinical Development: Lower Risk Myelodysplastic Syndromes

Unmet Medical Need in Myelodysplastic Syndromes (MDS)

MDS is a group of blood disorders in which the proliferation of malignant progenitor cells produces multiple malignant cell clones in the bone marrow resulting in disordered and ineffective production of the myeloid lineage, which includes red blood cells, white blood cells and platelets. In MDS, bone marrow and peripheral blood cells may have abnormal, or dysplastic, cell morphology. MDS is frequently characterized clinically by severe anemia, or low red blood cell counts, and low hemoglobin. In addition, other peripheral cytopenias, or low numbers of white blood cells and platelets, may cause life-threatening infections and bleeding. Transformation to AML occurs in up to 30% of MDS cases and results in poorer overall survival.

MDS is the most common of the myeloid malignancies. There are approximately 60,000 people in the United States living with the disease and approximately 16,000 reported new cases of MDS in the United States every year. MDS is primarily a disease of the elderly, with median age at diagnosis around 70 years. The majority of patients, approximately 70%, fall into what are considered to be the lower risk groups at diagnosis, according to the International Prognostic Scoring System that takes into account the presence of a number of disease factors, such as cytopenias and cytogenetics, to assign relative risk of progression to AML and overall survival.

Chronic anemia is the predominant clinical problem in patients who have lower risk MDS. Many of these patients become dependent on red blood cell transfusions due to low hemoglobin. Serial red blood cell transfusions can lead to elevated levels of iron in the blood and other tissues, which the body has no normal way to eliminate. Iron overload is a potentially dangerous condition. Studies in patients with MDS have shown that iron overload resulting from regular red blood cell transfusions is associated with a poorer overall survival and a higher risk of developing AML.

There have been no new drugs approved by the FDA for MDS therapy since 2006 and clinicians note that currently available therapies are likely to fail the majority of patients within two to three years after treatment initiation even if there is initial favorable response. Typically, patients with lower risk MDS are treated with erythropoiesis stimulating agents, or ESAs, such as erythropoietin, or EPO. Although ESAs provide an improvement in anemia in approximately 50% of patients, the effect is transient with a median duration of response of approximately two years. Once ESAs fail for patients, HMAs and lenalidomide have been used to improve anemia, but with limited success, such as reported 8-week RBC-TI rates of 17% for azacitidine, an HMA, and 27% for lenalidomide. No drug therapy has been shown prospectively to alter or delay disease progression.

IMerge: Ongoing Phase 2/3 Clinical Trial in Lower Risk MDS

Trial Design

IMerge is a two-part Phase 2/3 clinical trial evaluating imetelstat in transfusion dependent patients with Low or Intermediate-1 risk, also referred to as lower risk MDS, who are relapsed after or refractory to prior treatment with an ESA, relapsed or refractory to an ESA. To be eligible for IMerge, patients are required to be transfusion dependent, defined as requiring at least four units of packed red blood cells, or RBCs, over an eight-week period during the 16 weeks prior to entry into the trial. Part 1 of IMerge was designed as a Phase 2, open-label, single-arm trial to assess the efficacy and safety of a 7.5 mg/kg dose of imetelstat administered as an intravenous infusion every four weeks in approximately 30 patients. Part of 2 IMerge is a Phase 3 double-blind, randomized, placebo-controlled clinical trial that, based on discussions with U.S. and European regulatory authorities, we expect will support, if successful, the registration of imetelstat in lower risk MDS. The trial is designed to enroll approximately 170

patients with lower risk transfusion dependent MDS who are relapsed or refractory to an ESA, have not received prior treatment with either an HMA or lenalidomide and do not have a deletion 5q chromosomal abnormality.

The primary efficacy endpoint of IMerge is the rate of RBC transfusion independence, or RBC-TI, lasting at least eight weeks, defined as the proportion of patients without any RBC transfusion during any consecutive eight weeks since entry to the trial, or 8-week RBC-TI rate. Key secondary endpoints include the rate of RBC-TI lasting at least 24 weeks, or 24-week RBC-TI rate, and the rate of hematologic improvement-erythroid, or HI-E, defined as a rise in hemoglobin of at least 1.5 g/dL above the pretreatment level for at least eight weeks or a reduction of at least four units of RBC transfusions over eight weeks compared with the prior RBC transfusion burden. Other secondary efficacy endpoints include the time to and duration of RBC-TI; the proportion of patients achieving Complete Response, or CR, or Partial Response, or PR, according to the 2006 International Working Group, or IWG, criteria for MDS; the proportion of patients requiring RBC transfusions and the transfusion burden; the proportion of patients requiring the use of myeloid growth factors and the dose; assessments of the change in the patients' quality of life using several validated instruments; as well as an assessment of overall survival and time to progression to AML.

Current Status of the Phase 3 Portion of IMerge

The Phase 3 portion of IMerge opened for patient screening and enrollment in August 2019, and the first patient was dosed in October 2019. We plan to complete enrollment by the end of 2020 and expect top-line results by mid-year 2022. This trial is an important step in developing imetelstat as a potential alternative for lower risk MDS patients, who have limited treatment options

Many key aspects from the Phase 2 portion of IMerge remained the same for the Phase 3 portion, including the primary and secondary endpoints, the dose and schedule of imetelstat administration, and patient eligibility criteria. We expect the Phase 3 trial to be conducted at multiple medical centers globally, including North America, Europe, Middle East and Asia. Further information on the Phase 3 portion of IMerge, including the trial design, patient eligibility criteria and locations of clinical sites, is posted on clinicaltrials.gov.

Recently Reported Clinical Data from the Phase 2 Portion of IMerge Continue to Support Phase 3 Development

Thirty-two patients were initially enrolled in the Phase 2 portion of IMerge, of which a cohort of 13 patients had not received prior treatment with either an HMA or lenalidomide and did not have a deletion 5q chromosomal abnormality, also known as non-del(5q). Preliminary data from the Phase 2 portion of IMerge showed that the 13-patient initial cohort exhibited an increased rate and durability of transfusion independence compared to the overall trial population (8-week RBC-TI rate: 54% vs. 34%).

To increase the clinical experience and confirm the benefit-risk profile of imetelstat from the 13-patient initial cohort, new patient enrollment in the Phase 2 portion of IMerge was expanded and 25 additional patients were enrolled in an expansion cohort.

The combined initial cohort of 13 patients and the expansion cohort of 25 patients (n=38) represent a target patient population of transfusion dependent, non-del(5q) lower risk MDS patients who were relapsed/refractory to ESAs and naïve to HMA and lenalidomide treatment. These patients depend on serial RBC transfusions to manage anemia and fatigue. Moreover, dependency on RBC transfusions is associated with iron overload leading to secondary organ complications which results in poor survival. Therefore, the ultimate goal for most clinical trials in lower risk MDS is to enable patients to become transfusion independent for as long as possible.

In June 2019, an oral presentation was made at the EHA Annual Congress meeting reporting updated efficacy and safety data for an aggregate of 38 patients from the combined initial and expansion cohorts of the Phase 2 portion of IMerge. In the EHA presentation, data were reported using a clinical cut-off date of April 30, 2019. The 8-week RBC-TI rate for the combined cohorts was 42% (16/38) and 29% (11/38) of patients achieved a durable response with 24-week RBC-TI. The median duration of RBC-TI was 85.9 weeks (range: 8.0-140.9). The median follow-up was 15.7 months (range: 5.6-37.5) and the median treatment duration was 8.5 months (range: 0.02-37.5). The median number of treatment cycles was 9.0 (range: 1-39) and the median dose intensity was 95.2% of the dose of 7.5 mg/kg every four weeks. The baseline characteristics of the 38 patients highlight the high transfusion burden

of these patients, with a median baseline transfusion burden of 8 units per 8 weeks, and with the majority of the patients having received more than 4 units per 8 weeks prior to study entry.

Patient Baseline Characteristics	**n=38**
Median age (range), years	71.5 (46-83)
Male, n (%)	25 (66%)
Eastern Cooperative Oncology Group (ECOG) Performance Standard 0-1, n (%)	34 (89%)
International Prognostic Scoring System risk, n (%) Low Intermediate-1	 24 (63%) 14 (37%)
Baseline median RBC transfusion burden (range), units/8 weeks Patients with >4 units/8 weeks at baseline, n (%)	8 (4-14) 35 (92%)
World Health Organization 2001 category, n (%) Refractory Anemia with Ringed Sideroblasts (RARS) or Refractory Cytopenia with Multilineage Dysplasia and Ringed Sideroblasts (RCMD-RS) All others	 27 (71%) 11 (29%)
Prior ESA use, n (%)	34 (89%)
Serum erythropoietin (sEPO) > 500 mU/mL, n (%)	12[a] (32%)

[a] Of the 37 patients with sEPO levels reported.

Key efficacy data reported in the June 2019 EHA presentation are summarized in the table below:

Key Efficacy Outcomes	**n=38**
Rate of 8-week RBC-TI, n (%)	16 (42%)
Rate of 24-week RBC-TI, n (%)	11 (29%)
Median time to onset of RBC-TI (range), weeks	8.3 (0.1-40.7)
Median duration[a] of RBC-TI (range), weeks	85.9 (8.0-140.9)
Hematologic improvement-erythroid[b], or HI-E, n (%) ≥1.5 g/dL increase in hemoglobin lasting ≥ 8 weeks Transfusion reduction by ≥ 4 units/8 weeks	26 (68%) 12 (32%) 26 (68%)
Mean relative reduction of RBC transfusion burden from baseline, %	-68%

[a] Kaplan Meier method.

[b] As defined by International Working Group 2006 guidelines

These Phase 2 data highlight several key outcomes of imetelstat treatment in the trial, including meaningful and durable transfusion independence responses, notably in patients with high transfusion burdens, an indicator of a more difficult to treat population; similar transfusion independence activity across different MDS patient subtypes, such as, ring sideroblast positive, or RS+, and ring sideroblast negative, or RS-; and indications of potential disease-modifying activity, such as, a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval in 75% of 8-week TI responders. In addition, the 42% 8-week RBC-TI rate observed in the Phase 2 portion of IMerge compares favorably to currently used treatments in a similar patient population, such as azacitidine, an HMA, which has a reported 8-week RBC-TI rate of 17%, or lenalidomide, which has a reported 8-week RBC-TI rate of 27%.

As summarized in the table below, the safety profile was consistent with prior clinical trials of imetelstat in hematologic malignancies, and no new safety signals were identified. Reversible and manageable Grade 3/4 neutropenias and cytopenias were reported in 61% and 55% of the patients, respectively, and they were without

significant clinical consequences. Furthermore, 91% of the observed Grade 3/4 neutropenias and 92% of the observed Grade 3/4 thrombocytopenias were reversible within four weeks. Most frequent non-hematologic toxicities are listed in the table below. Grade 3 liver function test, or LFT, elevations reported in the trial were reversible.

Treatment Emergent Adverse Events (TEAE)	**All Grades n=38 (n, %)**	**Grade 3/4 n=38 (n, %)**
Hematologic Adverse Events		
Thrombocytopenia	25 (66%)	23 (61%)
Neutropenia	22 (58%)	21 (55%)
Anemia	10 (26%)	8 (21%)
Non-Hematologic Adverse Events		
Back Pain[a]	7 (18%)	0
Alanine Aminotransferase increased	7 (18%)	2 (5%)
Aspartate Aminotransferase increased	6 (16%)	3 (8%)
Bronchitis	6 (16%)	3 (8%)
Other Adverse Events[b]	6 (16%)	0
Headache	6 (16%)	1 (3%)

[a] In 3/7 (43%) patients back pain was an adverse event associated with infusion-related reaction.

[b] Nasopharyngitis, diarrhea, constipation, edema peripheral and asthenia.

Current Status of the Phase 2 Portion of IMerge

The Phase 2 portion of IMerge is closed to new patient enrollment, and patients remaining in the treatment phase are eligible to continue to receive imetelstat treatment, per investigator discretion. We expect more mature data, including treatment and follow-up, from the patients remaining in the Phase 2 portion of IMerge to be available in 2020 and expect to present such data at a future medical conference in 2020.

Potential Late-Stage Development Indication: Myelofibrosis

Unmet Medical Need in Myelofibrosis

MF, a type of myeloproliferative neoplasm, is a chronic blood cancer in which abnormal or malignant precursor cells in the bone marrow proliferate rapidly, causing scar tissue, or fibrosis, to form. As a result, normal blood production in the bone marrow is impaired and may shift to other organs, such as the spleen and liver, which can cause them to enlarge substantially. People with MF may have abnormally low or high numbers of circulating red blood cells, white blood cells or platelets, and abnormally high numbers of immature cells in the blood or bone marrow. MF patients can also suffer from debilitating constitutional symptoms, such as drenching night sweats, fatigue, severe itching, or pruritus, abdominal pain, fever and bone pain. There are approximately 13,000 patients living with MF in the United States and approximately 3,000 reported new cases each year. Up to 20% of patients with MF develop AML.

Approximately 70% of MF patients are classified as having Intermediate-2 or High-risk disease, as defined by the Dynamic International Prognostic Scoring System Plus described in a 2011 *Journal of Clinical Oncology* article. The only drug therapies approved by the FDA and other regulatory authorities for treating these MF patients are JAK inhibitors, ruxolitinib and fedratinib. Currently, no drug therapy is approved for those patients who fail or no longer respond to JAK inhibitor treatment, and median survival for MF patients after discontinuation from ruxolitinib is only approximately 14 – 16 months, representing a significant unmet medical need.

IMbark: Closed Phase 2 Trial in Relapsed/Refractory MF

Trial Design

IMbark was designed as a Phase 2 clinical trial to evaluate two doses of imetelstat (either 4.7 mg/kg or 9.4 mg/kg administered by intravenous infusion every three weeks) in patients with Intermediate-2 or High-risk MF who have relapsed after or are refractory to prior treatment with a JAK inhibitor, or relapsed/refractory MF. In December 2018, at the American Society of Hematology, or ASH, Annual Meeting, with a clinical cut-off date of October 22, 2018 and a median follow-up of 27.4 months (range: 0.2-33.0), we reported a median OS for the 9.4 mg/kg dosing arm of 29.9 months. In May 2019 with a clinical cut-off date of April 30, 2019, we reported a median OS in the 9.4 mg/kg dosing arm of 28.1 months. Our data compare favorably to the median overall survival of 14 – 16 months reported in medical literature for patients previously treated with JAK inhibitors.

Current Status of IMbark

In February 2020, we closed IMbark since we believe we have obtained sufficient data from the trial to support potential late-stage development in MF. As of the end of February 2020, no further follow-up of remaining patients is being conducted.

Recently Reported Comparative Analyses of IMbark Data and Real-World Data Suggest Potential Survival Benefit

Statistical analyses comparing IMbark clinical trial data to closely matched RWD were presented in a poster presentation at the EHA Annual Congress meeting in June 2019. The goal of the analyses was to further assess the potential OS benefit of imetelstat in relapsed/refractory MF patients treated with 9.4 mg/kg in IMbark compared to a closely matched patient population from RWD who were treated with best available therapy, or BAT.

The RWD were collected at the Moffitt Cancer Center from patients who had discontinued treatment with a JAK inhibitor and were subsequently treated with BAT. To mimic the effect of randomization and improve comparability, a propensity score analysis was conducted to match individual patients within each of the datasets with respect to baseline characteristics and prognostic factors that may impact OS. Guidelines for inclusion and exclusion criteria as defined in the IMbark clinical protocol and the following baseline patient characteristics were used for matching purposes:

- Age
- Platelet count
- Time from diagnosis to JAK inhibitor discontinuation
- JAK inhibitor duration
- Spleen size
- Janus Kinase-2 mutation
- Sex
- Dynamic International Prognostic Scoring System score
- ECOG performance status
- MF type
- Transfusion status

Of the 59 patients treated with imetelstat 9.4 mg/kg in IMbark, two could not be matched with RWD and were excluded from the analyses. Similarly, of the 96 patients treated with BAT from RWD, 58 patients did not meet the matching criteria. Therefore, the populations used for the analyses consisted of 57 patients from IMbark and 38 patients from RWD. Using the data from these matched populations prior to statistical adjustments, the calculated median OS was 33.8 months for the imetelstat-treated patients and 12.0 months for the patients from RWD treated with BAT, resulting in a hazard ratio of 0.35 and a p-value of 0.0003, as shown in the table below.

A propensity score analysis was conducted for each of the datasets and two statistical adjustment methods were applied to calculate median OS for each of the datasets (ATO and sIPTW, as indicated in the table below). Based on either of the statistical adjustment methods used, median OS of 30.7 months was reported for the imetelstat-treated patients. This was more than double the median OS of 12.0 months for patients from RWD treated with BAT. The hazard ratios for all three statistical methods were similar (0.33-0.35). Based on hazard ratios, there

was a 65% to 67% lower risk of death for patients treated with imetelstat, compared to closely matched patients from RWD treated with BAT in relapsed/refractory MF.

	Unadjusted Statistical Method		Statistical Adjustment Methods			
			Average Treatment Effect for Overlap Population (ATO)		Stabilized Inverse Probability Treatment Weighting (sIPTW)	
Main Analysis	**Imetelstat (IMbark)**	**RWD BAT (Moffitt)**	**Imetelstat (IMbark)**	**RWD BAT (Moffitt)**	**Imetelstat (IMbark)**	**RWD BAT (Moffitt)**
Median overall survival	33.77 months	12.04 months	30.69 months	12.04 months	30.69 months	12.04 months
Hazard ratio	0.35		0.35		0.33	
P-value	0.0003		0.0019		0.0003	

Two sensitivity analyses were conducted on the datasets to assess the potential impact on OS of early deaths post-JAK inhibitor discontinuation that were observed in RWD and the use of hematopoietic stem cell transplantation as a subsequent therapy. The results of the sensitivity analyses were consistent with results from the main analysis.

While we believe these analyses suggest favorable OS for imetelstat-treated relapsed/refractory MF patients compared to BAT in closely matched patients from RWD, comparative analyses between RWD and our clinical trial data have several limitations. For instance, the analyses create a balance between treatment groups with respect to commonly available covariates, but do not take into account the unmeasured and unknown covariates that may affect the outcomes of the analyses. Potential biases are introduced by factors which include, for example, the selection of the patients included in the analyses, misclassification in the matching process, the small sample size, and estimates that may not represent the outcomes for the true treated patient population. For these and other reasons, such comparative analyses should be considered carefully and with caution, and should not be relied upon as demonstrative or otherwise predictive or indicative of any future clinical trial results of imetelstat in relapsed/refractory MF.

In February 2020, we closed IMbark since we believe we have obtained sufficient data from the trial to support potential late-stage development of imetelstat in MF. As of the end of February 2020, no further follow-up of remaining patients is being conducted.

Potential Late-Stage Development in MF

In the fourth quarter of 2019, we conducted an End of Phase 2 meeting with the FDA to discuss the results of the IMbark Phase 2 clinical trial. Based on feedback from the meeting, we plan to submit Phase 3 trial design proposals in MF to the FDA, and, in the second quarter of 2020, to have further discussions with the FDA regarding a potential regulatory approval path, if any, for imetelstat in MF. Subsequent to these additional discussions, and after considering the timing and resources required, as well as other clinical development opportunities for imetelstat, we plan to make a decision regarding potential late-stage development of imetelstat in MF by mid-year 2020.

Status of Former Collaboration Agreement with Janssen

On November 13, 2014, we entered into a Collaboration and License Agreement with Janssen, or the Collaboration Agreement, pursuant to which we granted Janssen the exclusive worldwide rights to develop and commercialize imetelstat worldwide for all human therapeutic uses, including hematologic myeloid malignancies. Janssen terminated the Collaboration Agreement effective September 28, 2018. Upon the effective date of termination, we regained the global rights to the imetelstat program and are continuing development of imetelstat on our own. As a result of the termination of the Collaboration Agreement, we will not receive any milestone payments or royalties from Janssen for the development or commercialization of imetelstat, and Janssen has no obligations to us or any third parties, such as clinical sites or vendors, to fund any of the ongoing or any potential future imetelstat clinical trials. Since the effective termination date of the Collaboration Agreement, we have been fully responsible for all imetelstat development costs, including ongoing clinical trials, as well as costs for the prosecution of patents

that were formerly licensed to Janssen under the Collaboration Agreement. As of the end of September 2019, the transition of the imetelstat program to us from Janssen was completed.

For a further discussion of the former Collaboration Agreement with Janssen, see Note 4 on License Agreements in Notes to Financial Statements of this Form 10-K. Information about the transition of the imetelstat program from Janssen to us should be reviewed in the context of the section entitled "Risks Related to Transition of the Imetelstat Program to Geron" included in Part I, Item 1A, "Risk Factors" of this Form 10-K.

Intellectual Property

Intellectual property, including patent protection, is very important to our business. We file patent applications in the United States and other jurisdictions, and we also rely on trade secret protection and contractual arrangements to protect aspects of our business. An enforceable patent with appropriate claim coverage can provide an advantage over competitors who may seek to employ similar approaches to develop therapeutics, and so the future commercial success of imetelstat, and therefore our future success, will be in part dependent on our intellectual property strategy. The information provided in this section should be reviewed in the context of the section entitled "Risks Related to Protecting Our Intellectual Property" included in Part I, Item 1A, "Risk Factors" of this Form 10-K.

Our intellectual property strategy includes the early development of a technology, such as imetelstat, followed by rounds of increasingly focused innovation around a product opportunity, including identification and definition of a specific product candidate and uses thereof, manufacturing processes, product formulation and administration methods. The result of this process is that products in development are often protected by several families of patent filings that are filed at different times during the development process and cover different aspects of the product. Consequently, earlier filed, broad technology patents will usually expire ahead of patents covering later developments, such as product formulations, so that patent expirations on a product may span several years. Patent coverage may also vary from country to country based on the scope of available patent protection. There are also opportunities to obtain an extension of patent coverage for a product in certain countries, which adds further complexity to the determination of patent life.

We endeavor to monitor worldwide patent filings by third parties that are relevant to our business. Based on this monitoring, we may determine that an action is appropriate to protect our business interests. Such actions may include negotiating patent licenses where appropriate, filing oppositions against a patent, filing a request for post grant review against a patent or filing a request for the declaration of an interference with a patent application or issued patent.

Imetelstat

We own issued patents related to imetelstat in the United States, Europe and other countries. Composition of matter patents generally provide the most material coverage, and therefore may convey competitive advantages. Because imetelstat is still under development, subsequent innovation and associated patent filings may provide additional patent coverage with later expiration dates. Examination of overseas patent applications typically lags behind U.S. examination particularly where cases are filed first in the United States. It may be possible to obtain patent term extensions of some patents in some countries for claims covering imetelstat which could further extend the patent term.

We hold issued patents covering imetelstat composition of matter. In the United States, our composition of matter patent coverage extends through 2025. In Europe, our composition of matter patent coverage expires in 2024, and includes patent rights in Germany, France, the United Kingdom, and other member countries of the European Patent Convention. In Japan, our composition of matter patent coverage expires in 2024. It may be possible to obtain patent term extensions of some patents in some of these countries for claims covering imetelstat that could further extend the patent term, in some cases potentially for five years, which could extend the patent coverage protection for imetelstat until 2030 in the United States and 2029, in Europe and Japan, respectively. In some countries, such as the United States, the scope of protection under such patent term extensions, if any, would be defined by the scope of imetelstat composition as approved. We have issued patents pertaining to methods of use that extend patent coverage into 2033.The issued U.S. patent covers the treatment of both MF and MDS with imetelstat. The issued European patent covers the treatment of MF with imetelstat.

Our patent rights relating to imetelstat include those covering composition claims to the drug molecule and related nucleic acid telomerase inhibiting molecules, as well as reagents useful in manufacturing processes for the drug, and method of treatment and kit claims, certain of which are co-owned with other entities.

Upon the effective date of termination of the Collaboration Agreement with Janssen on September 28, 2018, we regained global rights to imetelstat and are continuing development of imetelstat on our own. In accordance with the termination provisions of the Collaboration Agreement, we have an exclusive worldwide license for intellectual property developed under the Collaboration Agreement for the further development of imetelstat, without any economic obligations to Janssen with respect to such license. Janssen has assigned to us certain intellectual property developed by it under the Collaboration Agreement. We now are responsible for the costs for maintaining, prosecuting and litigating all imetelstat intellectual property that we own.

Licensing

Former Collaboration and License Agreement with Janssen; Supply Agreement

On November 13, 2014, we entered into the Collaboration Agreement with Janssen, pursuant to which we granted to Janssen exclusive worldwide rights to develop and commercialize imetelstat for all human therapeutic uses, including hematologic myeloid malignancies.

Janssen terminated the Collaboration Agreement effective September 28, 2018. As of the end of September 2019, the imetelstat program was fully transferred from Janssen to us. In addition, in June 2019, we entered into a Clinical Supply Agreement, or Supply Agreement, under which we will purchase from Janssen certain inventories of drug product, drug substance and raw materials for imetelstat manufacturing, for current and potential future clinical trials of imetelstat. As of December 31, 2019, Janssen has shipped drug product to our specified drug distribution centers, and we plan to pay Janssen approximately $7.5 million for such drug product in the first quarter of 2020. In addition, Janssen has delivered to us drug substance and raw materials conforming to our required specifications, and we expect to pay Janssen approximately $6.7 million for such materials in the first quarter of 2020. Some of this material will require further processing in order to be used in clinical trials, and/or may also require regulatory review and acceptance prior to use. We do not expect to receive any further material from Janssen under the Supply Agreement.

Since September 28, 2018, we have been responsible for 100% of the development costs for the imetelstat program. We will not receive any milestone payments or royalties from Janssen for the development or commercialization of imetelstat, and Janssen has no obligations to us or any third parties, such as clinical sites or vendors, to fund any of the ongoing or any potential future imetelstat clinical trials.

For a further discussion of the Collaboration Agreement, see Note 4 on License Agreements in Notes to Financial Statements of this Form 10-K. Information about the transition of the imetelstat program from Janssen to us should be reviewed in the context of the section entitled “Risks Related to Transition of the Imetelstat Program to Geron” included in Part I, Item 1A, “Risk Factors” of this Form 10-K.

Other License Agreements

We have granted a license to Janssen Pharmaceuticals, Inc., or Janssen Pharmaceuticals, an affiliate of Janssen, for the research, development and commercialization of products based on specialized oligonucleotide backbone chemistry and novel amidates for disorders, excluding cancers originating from the blood or bone marrow. In connection with this license, we also granted to Janssen Pharmaceuticals a non-exclusive worldwide license under our patent rights covering the synthesis of monomers, which are the building blocks of oligonucleotides.

We previously granted patent licenses to a number of other organizations to utilize aspects of our technologies to develop and commercialize products outside of the imetelstat program. Revenues under our patent license agreements related to our telomerase technology have ceased due to patent expirations on such technology. With the exception of one patent license, our patent license agreements related to our telomerase technology expired or were terminated by the end of the fourth quarter of 2019. Our last remaining patent license agreement related to

telomerase technology was terminated in January 2020, and the final payment of $50,000 under that license was received in the first quarter of 2020.

See Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations—Revenues" for a further discussion of revenues from our license agreements.

Manufacturing

A typical sequence of steps in the manufacture of imetelstat drug product includes the following key components:

- starting materials, which are well-defined raw materials that are used to make bulk drug substance;
- bulk drug substance, which is the active pharmaceutical ingredient in a drug product that provides pharmacological activity or other direct effect in the treatment of disease; and
- final drug product, which is the finished dosage form that contains the drug substance that is shipped to the clinic for patient treatment.

In June 2019 we entered into a Supply Agreement with Janssen to purchase certain inventories of drug product, drug substance and raw materials for imetelstat manufacturing. Delivery of all materials under the Supply Agreement was completed in December 2019. Some of this material will require further processing in order to be used in clinical trials, and/or may also require regulatory review and acceptance prior to use. See the section entitled, "Licensing--Former Collaboration and License Agreement with Janssen; Supply Agreement" for further information. During 2019, we engaged third-party contractors to re-establish our own manufacturing supply chain in order to further process the Janssen purchased materials as well as to be able to manufacture and supply additional quantities of imetelstat that meet applicable regulatory standards for current and potential future clinical trials and potential commercial uses. Many of these contractors previously had relationships with Geron related to the manufacture and/or supply of imetelstat.

We do not have direct control over third-party personnel or operations. These third-party contractors, and/or any other contractors that we may rely upon for the manufacture and/or supply of imetelstat, typically complete their services on a proposal by proposal basis under master supply agreements and may need to make substantial investments to enable sufficient capacity increases and cost reductions, and to implement those regulatory and compliance standards necessary for successful Phase 3 clinical trials and commercial production. These third-party contractors, and/or any other contractors that we may rely upon for the manufacture and/or supply of imetelstat, may not be able to achieve such capacity increases, cost reductions, or regulatory and compliance standards, and even if they do, such achievements may not be at a commercially reasonable cost. We are responsible for establishing any long-term commitments or commercial supply agreements with any of the third-party contractors for imetelstat. The information provided in this section should be reviewed in the context of the section entitled "Risks Related to Manufacturing" and "Risks Related to Transition of the Imetelstat Program to Geron" under Part I, Item 1A, "Risk Factors".

Consultants

We have established, and expect to continue to establish, consulting agreements with drug development professionals, clinicians, attorneys and regulatory experts with experience in numerous fields, including clinical science, biostatistics, clinical operations, pharmacovigilance, quality, manufacturing and regulatory affairs. We retain each consultant according to the terms of a consulting agreement. Under such agreements, we pay them a consulting fee and reimburse them for out-of-pocket expenses incurred in performing their services for us. In addition, we have in the past and may again in the future grant options to purchase our common stock to consultants, subject to the vesting requirements contained in the consulting agreements. Our consultants may be employed by other entities and therefore may have commitments to their employer, or may have other consulting or advisory agreements that may limit their availability to us.

Competition

The pharmaceutical and biotechnology industries are characterized by intense and dynamic competition with rapidly advancing technologies and a strong emphasis on proprietary products. While we believe our proprietary oligonucleotide chemistry; experience with the biological mechanisms related to imetelstat, telomeres and telomerase; clinical data to date indicating potential disease-modifying activity with imetelstat treatment; and knowledge and expertise around the development of potential treatments for hematologic myeloid malignancies provide us with competitive advantages, we face competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions and governmental agencies and public and private research institutions. Imetelstat will compete, if approved, with other products and therapies that currently exist, are being developed or will in the future be developed, some of which we may not currently be aware.

Competition in Lower Risk Myelodysplastic Syndromes (MDS)

The current standard of care for the treatment of lower risk MDS is the use of erythropoiesis stimulating agents, or ESAs, to address the patient's chronic anemia. Once ESAs are no longer effective, serial blood transfusions are often administered that can cause damaging effects to other organs due to iron overload, resulting in shorter survival. In addition, other best available therapies are used without durable effect for the patient.

In lower risk MDS, data from the Phase 2 portion of IMerge suggest potentially meaningful and durable transfusion independence, activity across MDS patient subtypes, and potential disease-modifying activity achievable with imetelstat treatment. We believe that these key features are differentiators compared to currently approved products as well as investigational drugs currently in clinical development.

If approved for commercial sale for the treatment of lower risk MDS, imetelstat would compete against a number of currently existing therapies, including ESAs and other hematopoietic growth factors that are indicated for anemia; immunomodulators, such as Revlimid (lenalidomide) by Celgene Corporation, a Bristol-Myers Squibb Corporation, or Celgene; hypomethylating agents, such as Vidaza (azacitidine) by Celgene or other manufacturers of generic azacitidine, and Dacogen (decitabine) by Otsuka America Pharmaceutical, Inc. and other manufacturers in the United States and Janssen in the European Union, or EU.

Other therapies currently in Phase 3 development, some of which may obtain regulatory approval earlier than imetelstat include, Reblozyl (luspatercept), a TGF-beta inhibitor, by Acceleron Pharma, Inc., or Acceleron, in collaboration with Celgene, whose new drug application (NDA) has been submitted to the FDA for potential approval; oral versions of azacitidine by Celgene; roxadustat, a hypoxia-inducible factor prolyl hydroxylase inhibitor, by FibroGen, Inc.; and APR-246, an activator of p53 protein, by Aprea Therapeutics, Inc.

Competition in Intermediate-2 or High-Risk Myelofibrosis (MF)

The current standard of care for the treatment of Intermediate-2 or High-risk MF is the use of janus kinase, or JAK, inhibitors, to address the patient's symptoms. Once JAK inhibitors fail or are no longer effective, a variety of best available therapies are used since there are no approved treatments for this patient population and median overall survival is 14 – 16 months after discontinuation from the predominant JAK inhibitor being used today.

In Intermediate-2 or High-risk relapsed/refractory MF, data from the IMbark Phase 2 clinical trial suggest potential disease-modifying activity with imetelstat treatment and a potential meaningful improvement in overall survival, which is supported in a comparison to real-world data.

If approved for commercial sale for the treatment of MF, imetelstat would compete against currently approved JAK inhibitors, Jakafi (ruxolitinib) by Incyte Corporation and Inrebic (fedratinib) by Celgene. Other treatment modalities for MF include hydroxyurea for the management of splenomegaly, leukocytosis, thrombocytosis and constitutional symptoms; splenectomy and splenic irradiation for the management of splenomegaly and co-existing cytopenias, or low blood cell counts; chemotherapy and pegylated interferon. Drugs for the treatment of MF-associated anemia include ESAs, androgens, danazol, corticosteroids, thalidomide and lenalidomide.

Other therapies currently in Phase 3 development, some of which may obtain regulatory approval earlier than imetelstat include pacritinib, a JAK inhibitor, by CTI Biopharma, and momelotinib, a JAK inhibitor, by Sierra Oncology. Non-JAK inhibitor approaches for MF currently under investigation that could compete with imetelstat in the future include CPI-0610, a BET inhibitor, by Constellation Pharmaceuticals, Inc.; luspatercept, a TGF-beta inhibitor, by Acceleron, in collaboration with Celgene; PRM-151, an anti-fibrosis antibody, by Promedior, Inc.; navitoclax , a BCLXL, BCL-2 and BCLW inhibitor, by AbbVie; LCL 161, an inhibitor of apoptosis protein (IAP), by Novartis; and KRT-232, an inhibitor of MDM2, by Kartos Therapeutics, Inc.

Many of our competitors, either alone or with their strategic partners, could have substantially greater financial, technical and human resources than we do and significantly greater experience in obtaining FDA and other regulatory approvals of treatments and commercializing those treatments. We believe that the commercial success of imetelstat is subject to a number of factors, including: product efficacy and safety; method of product administration; cost of manufacturing; the timing and scope of regulatory consents; status of coverage and reimbursement; price; the level of generic competition; and our patent position.

As a result of the foregoing, competitors may develop more commercially desirable or affordable products than imetelstat, or achieve earlier patent protection or product commercialization than we may be able to achieve with imetelstat. Competitors have developed, or are in the process of developing, technologies that are, or in the future may be, competitive to imetelstat. Some of these products may have an entirely different approach or means of accomplishing therapeutic effects similar or superior to those that may be demonstrated by imetelstat. Competitors may develop products that are safer, more effective, or less costly than imetelstat, or more convenient to administer to patients and, therefore, present a serious competitive threat to imetelstat. In addition, competitors may price their products below what we may determine to be an acceptable price for imetelstat, may receive better third-party payor coverage and/or reimbursement, or may be more cost-effective than imetelstat. Such competitive products or activities by competitors may render imetelstat obsolete, which may cause us to cease any further development or future commercialization of imetelstat, which would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

Government Regulation

Regulation by governmental authorities in the United States and other countries is a significant factor in the development, manufacture and marketing of imetelstat. Imetelstat will require regulatory approval by governmental agencies prior to commercialization. In particular, potential human therapeutic products, such as imetelstat, are subject to rigorous preclinical and clinical testing and other approval procedures of the FDA and similar regulatory authorities in European and other countries. Various governmental statutes and regulations also govern or influence testing, manufacturing, safety, labeling, storage, import, export, distribution and recordkeeping related to such products and their marketing. The process of obtaining these approvals and the subsequent compliance with appropriate statutes and regulations require the expenditure of substantial time and money, and there can be no guarantee that approvals will be granted. The information provided in this section should be reviewed in the context of the sections entitled “Risks Related to the Development of Imetelstat” and “Risks Related to Regulatory Compliance Matters and Commercialization of Imetelstat” under Part I, Item 1A, “Risk Factors”.

United States Food and Drug Administration Regulatory Approval Process

Prior to commencement of clinical trials involving humans, preclinical testing of new pharmaceutical products is generally conducted on animals in the laboratory to evaluate the potential efficacy and safety of a product candidate. The results of these trials are submitted to the FDA as part of an Investigational New Drug, or IND, application, which must become effective before clinical testing in humans can begin. For example, we have two active INDs for our imetelstat program. The FDA can place an IND on clinical hold at any time, which prevents the conduct of clinical trials under the IND until safety concerns are addressed by the IND sponsor to the FDA’s satisfaction. Typically, clinical evaluation involves a time consuming and costly three phase trial process. In Phase 1, clinical trials are conducted with a small number of healthy volunteers or patients afflicted with a specific disease to assess safety and to evaluate the pattern of drug distribution and metabolism within the body. In Phase 2, clinical trials are conducted with groups of patients afflicted with a specific disease in order to determine preliminary efficacy, optimal dosages and expanded evidence of safety. The Phase 2 trials can be conducted comparing the investigational treatment to a comparator arm, or not. If used, a comparator usually includes standard of care therapy. Safety and efficacy data from

Phase 2 clinical trials, even if favorable, may not provide sufficient rationale for proceeding to a Phase 3 clinical trial. In Phase 3, large scale, multi-center, comparative trials are conducted with patients afflicted with a target disease to provide sufficient data to demonstrate the efficacy and safety required by the FDA. The FDA closely monitors the progress of each of the three phases of clinical testing and may, at its discretion, re-evaluate, alter, suspend, or terminate the trials. Human clinical trials must be conducted in compliance with Good Clinical Practice regulations and applicable laws, with the oversight of Institutional Review Boards for the protection of human subjects. The manufacture of drug product candidates is subject to requirements that drugs be manufactured, packaged and labeled in conformity with current Good Manufacturing Practices and applicable laws.

The results of the preclinical and clinical testing of drugs and complete manufacturing information are submitted to the FDA in the form of a New Drug Application, or NDA, for review and approval prior to commencement of commercial sales. Submission of an NDA requires the payment of a substantial user fee to the FDA, which may be waived in certain cases. In responding to an NDA submission, the FDA may approve the drug for commercialization, impose limitations on its indications for use and labeling, including in the form of Risk Evaluation and Mitigation Strategies or may issue a complete response letter. Even if an NDA is approved, its sponsor is subject to ongoing and pervasive regulatory compliance requirements.

European and Other Regulatory Approval Process

Prior to initiating clinical trials in a region outside of the United States, a clinical trial application must be submitted and reviewed by the appropriate regulatory authority regulating the country in which the trial will be conducted. Whether or not FDA clearance or approval has been obtained, approval of a product by comparable regulatory authorities in Europe and other countries is necessary prior to commencement of marketing the product in such countries. The regulatory authorities in each country may impose their own requirements and may refuse to grant an approval, or may require additional data before granting it, even though the relevant product has been cleared or approved by the FDA or another authority. As with the FDA, the regulatory authorities in the European Union, or EU, and other developed countries have lengthy approval processes for pharmaceutical products. The process for gaining approval in particular countries varies, but generally follows a similar sequence to that described for FDA approval. In Europe, the European Medicine Agency, or EMA, and the European Committee for Proprietary Medicinal Products for Human Use, or CHMP, provide a mechanism for EU member states to exchange information on all aspects of product licensing. The EU has established the EMA for the evaluation of medical products, with a centralized procedure which is mandatory for orphan and oncology products and which grants a single marketing authorization valid in all EU member states.

Orphan Drug Designation

For a drug to qualify for orphan drug designation by the FDA, both the drug and the disease or condition must meet certain criteria specified in the Orphan Drug Act, or ODA, and FDA's implementing regulations. Orphan drug designation is granted by the FDA's Office of Orphan Drug Products in order to support development of medicines for underserved or rare diseases and patient populations that affect fewer than 200,000 people in the United States or, if the disease or condition affects more than 200,000 individuals annually in the United States, if there is no reasonable expectation that the cost of developing and making the drug would be recovered from sales in the United States. Orphan drug designation qualifies the sponsor of the drug for various development incentives of the ODA, including, if regulatory approval is received, the potential for seven years of market exclusivity with certain limited exceptions and certain tax credits for qualified clinical testing. A marketing application for a prescription drug product that has received orphan drug designation is not subject to a prescription drug user fee unless the application includes an indication for a disease or condition other than the rare disease or condition for which the drug was granted orphan drug designation. The granting of orphan drug designation does not alter the standard regulatory requirements and process for obtaining marketing approval. The safety and effectiveness of a drug must be established through adequate and well-controlled studies. Orphan drug exclusivity does not prevent the FDA from approving a different drug for the same disease or condition, or the same drug for a different disease or condition.

On June 11, 2015 and December 23, 2015, the FDA granted orphan drug designation to imetelstat for the treatment of MF and MDS, respectively.

Orphan drug designation by the European Commission provides regulatory and financial incentives for companies to develop and market therapies that treat a life-threatening or chronically debilitating condition affecting no more than five in 10,000 persons in the EU, and where no satisfactory treatment is available. In the EU, orphan drug designation also entitles a party to financial incentives such as reduction of fees or fee waivers, as well as protocol assistance from the EMA during the product development phase, and direct access to the centralized authorization procedure. In addition, ten years of market exclusivity is granted following drug product approval, meaning that another application for marketing authorization of a later similar medicinal product for the same therapeutic indication will generally not be approved in the EU. 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 to not justify maintenance of market exclusivity.

On December 14, 2015, the EMA granted orphan drug designation to imetelstat for the treatment of MF.

Fast Track Designation

Fast Track designation provides opportunities for frequent interactions with FDA review staff, as well as eligibility for priority review, if relevant criteria are met, and rolling review. Fast Track designation is intended to facilitate and expedite development and review of a New Drug Application to address unmet medical needs in the treatment of serious or life-threatening conditions. However, Fast Track designation does not accelerate conduct of clinical trials or mean that the regulatory requirements are less stringent, nor does it ensure that imetelstat will receive marketing approval or that approval will be granted within any particular timeframe. In addition, the FDA may withdraw Fast Track designation if it believes that the designation is no longer supported by data emerging from the imetelstat clinical development program.

In October 2017, the FDA granted Fast Track designation to imetelstat for the treatment of adult patients with transfusion-dependent anemia due to Low or Intermediate-1 risk MDS who are non-del(5q) and who are refractory or resistant to treatment with an ESA.

In September 2019, the FDA granted Fast Track designation to imetelstat for the treatment of adult patients with Intermediate-2 or High-risk MF whose disease has relapsed after or is refractory to janus kinase (JAK) inhibitor treatment, or relapsed/refractory MF.

Fraud and Abuse, Data Privacy and Security, and Transparency Laws and Regulations

We may also be subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which we conduct our business. These additional healthcare regulations could affect our current and future arrangements with healthcare professionals, principal investigators, consultants, customers and third-party payors. Such laws include, without limitation, state and federal anti-kickback, fraud and abuse, false claims, privacy and security, and physician payment sunshine laws.

The federal Anti-Kickback Statute makes it illegal for any person or entity, including a prescription drug manufacturer (or a party acting on its behalf) to knowingly and willfully, directly or indirectly, solicit, receive, offer, or pay any remuneration that is intended to induce the referral of business, including the purchase, order, or lease of any good, facility, item or service for which payment may be made under a federal healthcare program, such as Medicare or Medicaid. The term "remuneration" has been broadly interpreted to include anything of value. Several courts have interpreted the statute's intent requirement to mean that if any one purpose of an arrangement involving remuneration is to induce referrals of federal healthcare covered business, the Anti-Kickback Statute has been violated. The Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Reconciliation Act, collectively the Affordable Care Act or ACA, among other things, amended the intent requirement of the federal Anti-Kickback Statute such that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate, in order to commit a violation.

Federal civil and criminal false claims and false statement laws, including the federal civil False Claims Act and its whistleblower or *qui tam* provisions that permit private individuals to bring an action on behalf of the government to enforce the civil False Claims Act, prohibit, among other things, any person or entity from knowingly presenting, or causing to be presented, for payment to, or approval by, federal programs, including Medicare and

Medicaid, claims for items or services, including drugs, that are false or fraudulent or not provided as claimed. Entities can be held liable under these laws if they are deemed to "cause" the submission of false or fraudulent claims by, for example, providing inaccurate billing or coding information to customers, promoting a product off-label, or for providing medically unnecessary services or items. 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 federal civil False Claims Act. Criminal prosecution is also possible for making or presenting a false, fictitious or fraudulent claim to the federal government.

The federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, created criminal and civil liability for, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private third-party payors, knowingly and willfully embezzling or stealing from a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare offense, and knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services.

HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, and their implementing regulations, imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security, transmission and breach reporting of individually identifiable health information, upon entities subject to the law, such as health plans, healthcare clearinghouses and certain healthcare providers and their respective business associates that perform services for them that involve individually identifiable health information. 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 U.S. federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions.

The federal Physician Payments Sunshine Act requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program, with specific exceptions, to report annually to the Centers for Medicare & Medicaid Services, or CMS, information related to payments or other transfers of value made to physicians, as defined by such law, and teaching hospitals, and applicable manufacturers and applicable group purchasing organizations to report annually to CMS ownership and investment interests held by physicians and their immediate family members.

Analogous state and foreign 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 reimbursed by non-governmental third-party payors, including private insurers. Additionally, we may be subject to state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government. Further, we may be subject to state laws that require drug manufacturers to report information related to payments and other transfers of value to physicians, other healthcare providers and healthcare entities, or marketing expenditures, as well as state and local laws that require the registration of pharmaceutical sales representatives; state laws that require the reporting of information related to drug pricing; and state and foreign laws governing the privacy and security of health information, including the General Data Protection Regulation, or GDPR, from the European Union, or EU, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Efforts to ensure that our current and future business arrangements will comply with applicable healthcare, privacy and data security laws and regulations will involve substantial costs. For example, the GDPR, which became effective on May 25, 2018, imposes several requirements relating to the consent of the individuals to whom the personal data relates, the information provided to the individuals, the security and confidentiality of the personal data, data breach notification and the use of third-party processors in connection with the processing of personal data. The GDPR also imposes strict rules on the transfer of personal data out of the EU, provides an enforcement authority and authorizes the imposition of large penalties for noncompliance, including the potential for fines of up to €20 million or 4% of the annual global revenues of the noncompliant company, whichever is greater. The GDPR has increased our responsibility and potential liability in relation to personal data that we process or control compared to prior EU law, including in clinical trials, and we may be required to put in place additional mechanisms

to ensure compliance with the GDPR, which could divert management's attention and increase our cost of doing business. Likewise, we expect that there will continue to be new proposed laws, regulations and industry standards relating to privacy and data protection in the United States, the EU and other jurisdictions, such as the California Consumer Privacy Act of 2018, which has been characterized as the first "GDPR-like" privacy statute to be enacted in the United States because it mirrors a number of the key provisions in the GDPR, that went into effect beginning January 1, 2020, and we cannot determine the impact that such laws, regulations and standards will have on our business. In any event, it is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations, agency guidance or case law involving applicable healthcare or privacy laws, including the GDPR, 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.

If our operations are found to be in violation of any of these or any other healthcare and privacy-related regulatory laws that may apply to us, we may be subject to significant penalties, including the imposition of significant civil, criminal and administrative penalties, damages, monetary fines, disgorgement, imprisonment, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, reputational harm, diminished profits and future earnings, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, and curtailment of our operations, any of which could adversely affect our ability to operate our business and our results of operations. Defending against any such actions can be costly, time-consuming and may require significant financial and personnel resources. Therefore, even if we are successful in defending against any such actions that may be brought against us, our business may be impaired.

Reimbursement and Healthcare Reform

Significant uncertainty exists as to the coverage and reimbursement status of any product candidate that receives regulatory approval. In the United States and markets in other countries, sales of imetelstat, if approved for commercial sale, will depend, in part, on the extent to which third-party payors provide coverage and establish adequate reimbursement levels for imetelstat.

In the United States, third-party payors include federal and state healthcare programs, government authorities, private managed care providers, private health insurers and other organizations. There has been increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. Specifically, there have been several recent U.S. Congressional inquiries and federal and state legislative activity designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, reduce the cost of drugs under Medicare, and reform government program reimbursement methodologies for drugs, some of which are included in the Trump Administration's budget proposal for fiscal year 2020. Additionally, at the federal level, the Trump Administration released a "Blueprint" that contains additional proposals to increase manufacturer competition, increase the negotiating power of certain federal healthcare programs, incentivize manufacturers to lower the list price of their products and reduce the out of pocket costs of drug products paid by consumers. The Department of Health and Human Services, or HHS, has solicited feedback on some of these measures and, at the same time, has implemented others under its existing authority. For example, in May 2019, CMS issued a final rule to allow Medicare Advantage plans the option to use step therapy for Part B drugs beginning January 1, 2020. This final rule codified CMS's policy change that was effective January 1, 2019. While a number of these and other measures may require additional authorization to become effective, Congress and the Trump Administration have each indicated that they will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, to encourage importation from other countries and bulk purchasing. Further, third-party payors are increasingly challenging the price, examining the medical necessity and reviewing the cost-effectiveness of medical drug products and medical services, in addition to questioning their safety and efficacy. Such payors may limit coverage to specific drug products on an approved list, also known as a formulary, which might not include all of the FDA-approved drugs for a particular indication. We may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of

imetelstat, in addition to the costs required to obtain the FDA approvals. Nonetheless, imetelstat may not be considered medically necessary or cost-effective.

Moreover, the process for determining whether a third-party payor will provide coverage for a drug product may be separate from the process for setting the price of a drug product or for establishing the reimbursement rate that such a payor will pay for the drug product. A payor's decision to provide coverage for a drug product does not imply that an adequate reimbursement rate will be approved. Further, one payor's determination to provide coverage for a drug product does not assure that other payors will also provide coverage for the drug product, as there is no uniform coverage and reimbursement policy among third-party payors in the United States. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in imetelstat.

The United States and some foreign jurisdictions are considering or have enacted legislative and regulatory proposals to contain healthcare costs, as well as to improve quality and expand access. For example, in March 2010, the ACA was signed into law, which included a number of provisions of importance to the biopharmaceutical industry. There remain judicial and Congressional challenges to certain aspects of the ACA, as well as efforts by the Trump Administration to repeal or replace certain aspects of the ACA. For example, since January 2017, President Trump has signed two executive orders and other directives designed to delay, circumvent, or loosen certain requirements mandated by the ACA. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, several bills affecting the implementation of certain taxes under the ACA have been signed into law. The Tax Cuts and Jobs Act of 2017, or Tax Act, includes a provision which repealed, 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." In addition, the 2020 federal spending package permanently eliminated, effective January 1, 2020, the ACA-mandated "Cadillac" tax on high-cost employer-sponsored health coverage and medical device tax and, effective January 1, 2021, will also eliminate the health insurer tax.

The Bipartisan Budget Act of 2018, among other things, amended the ACA, effective January 1, 2019, to close the coverage gap in most Medicare Part D drug plans, commonly referred to as the "donut hole". In December 2018, CMS published a new final rule permitting further collections and payments to and from certain ACA qualified health plans and health insurance issuers under the ACA risk adjustment program in response to the outcome of federal district court litigation regarding the method CMS uses to determine this risk adjustment. On December 14, 2018, a Texas U.S. District Court Judge ruled that the ACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Additionally, on December 18, 2019, the U.S. Court of Appeals for the 5th Circuit upheld the District Court ruling that the individual mandate was unconstitutional and remanded the case back to the District Court to determine whether the remaining provisions of the ACA are invalid as well. It is unclear how this decision, future decisions, subsequent appeals, and other efforts to repeal and replace the ACA will impact the ACA. We expect that other healthcare reform measures that may be adopted in the future may result in more rigorous coverage criteria and lower reimbursement, and additional downward pressure on the price that may be charged for imetelstat.

In addition, other legislative changes have been proposed and adopted since the ACA was enacted. For example, in August 2011, the Budget Control Act of 2011 was enacted, which, among other things, created the Joint Select Committee on Deficit Reduction to recommend to Congress proposals in spending reductions. The Joint Select Committee on Deficit Reduction did not achieve a targeted deficit reduction of at least $1.2 trillion for fiscal years 2012 through 2021, triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, which went into effect beginning on April 1, 2013 and, due to subsequent legislative amendments to the statute, including the Bipartisan Budget Act of 2018, will stay in effect through 2029 unless additional Congressional action is taken. Additionally, in January 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, reduced Medicare payments to several providers, including hospitals and imaging centers. More recently, there has been heightened governmental scrutiny in the United States to control the rising cost of healthcare.

Information About Our Officers

The following table sets forth certain information with respect to our executive officers as of January 31, 2020:

Name	Age	Position
John A. Scarlett, M.D.	68	President, Chief Executive Officer and Chairman of the Board
Olivia K. Bloom	51	Executive Vice President, Finance, Chief Financial Officer and Treasurer
Anil Kapur	50	Executive Vice President, Corporate Strategy and Chief Commercial Officer
Melissa A. Kelly Behrs	56	Executive Vice President, Chief Business Officer
Andrew J. Grethlein, Ph.D.	55	Executive Vice President, Chief Operating Officer
Aleksandra Rizo, M.D., Ph.D.	45	Executive Vice President, Chief Medical Officer
Stephen N. Rosenfield, J.D.	70	Executive Vice President, Chief Legal Officer and Corporate Secretary

John A. Scarlett, M.D., has served as our Chief Executive Officer and a director since September 2011 and President since January 2012 and was appointed to Chairman of the Board in December 2018. Dr. Scarlett has served as a director for Chiasma, Inc., a biopharmaceutical company focused on transforming injectable drugs into oral medications, since February 2015 and CytomX Therapeutics, Inc., a biopharmaceutical company focused on developing antibody therapeutics for the treatment of cancer, since June 2016. Prior to joining Geron, Dr. Scarlett served as President, Chief Executive Officer and a member of the board of directors of Proteolix, Inc., a privately held, oncology-oriented biopharmaceutical company, from February 2009 until its acquisition by Onyx Pharmaceuticals, Inc., an oncology-oriented biopharmaceutical company, in November 2009. From February 2002 until its acquisition by Ipsen, S.A. in October 2008, Dr. Scarlett served as the Chief Executive Officer and a member of the board of directors of Tercica, Inc., an endocrinology-oriented biopharmaceutical company, and also as its President from February 2002 through February 2007. From March 1993 to May 2001, Dr. Scarlett served as President and Chief Executive Officer of Sensus Drug Development Corporation. In 1995, he co-founded Covance Biotechnology Services, Inc., a contract biopharmaceutical manufacturing operation, and served as a member of its board of directors from inception to 2000. From 1991 to 1993, Dr. Scarlett headed the North American Clinical Development Center and served as Senior Vice President of Medical and Scientific Affairs at Novo Nordisk Pharmaceuticals, Inc., a wholly owned subsidiary of Novo Nordisk A/S. Dr. Scarlett received his B.A. degree in chemistry from Earlham College and his M.D. from the University of Chicago, Pritzker School of Medicine.

Olivia K. Bloom has served as our Executive Vice President, Finance since February 2014, Chief Financial Officer since December 2012 and Treasurer since February 2011. Ms. Bloom previously served as our Senior Vice President, Finance from December 2012 to February 2014, Chief Accounting Officer from September 2010 to December 2012 and Vice President, Finance from January 2007 to December 2012. Ms. Bloom joined the Company in 1994 as a Senior Financial Analyst and from 1996 to 2011 served as our Controller. Prior to joining Geron, Ms. Bloom started her career in public accounting at KPMG Peat Marwick and became a Certified Public Accountant in 1994. Ms. Bloom graduated Phi Beta Kappa with a B.S. in Business Administration from the University of California at Berkeley.

Anil Kapur has served as our Executive Vice President, Corporate Strategy and Chief Commercial Officer since December 2019. Prior to joining Geron, Mr. Kapur was Chief Commercial Officer at Actinium Pharmaceuticals, Inc., a clinical stage biopharmaceutical company, from February 2018 to November 2019. From October 2016 until February 2018, Mr. Kapur was Vice President, Head of Early Assets, Biomarkers and External Innovation for Worldwide Oncology Commercialization at Bristol-Myers Squibb Company, a global biopharmaceutical company. Mr. Kapur served as Vice President, Global Head of Commercial and Portfolio Strategy at Baxalta, Incorporated, in a newly created Oncology Division, from November 2015 until after its acquisition by Shire plc in July 2016. Before joining Baxalta, Mr. Kapur held marketing and sales leadership roles of increasing responsibility during his 15-year tenure at the Janssen Pharmaceutical Companies of Johnson & Johnson (Janssen). As Vice President, Commercial Leader, Hematology Franchise in Janssen's Global Commercial Strategy Organization, he led the development and execution of commercial strategy and launch plans for in-market development, late development, and early pipeline assets, including imetelstat. Among Mr. Kapur's most recognized achievements while at Janssen were the successful global launches of two transformational blockbuster hematology-oncology drugs, Imbruvica and Darzalex. Mr. Kapur holds a Bachelor of Engineering from Birla Institute of

Technology in India; an M.S. in Industrial Engineering from Louisiana Tech University; and an M.B.A from the Fuqua School of Business at Duke University.

Melissa A. Kelly Behrs has served as our Executive Vice President, Chief Business Officer since January 2019. Previously, she was our Executive Vice President, Business Development and Portfolio & Alliance Management, from February 2014 to January 2019, and our Senior Vice President, Portfolio and Alliance Management from September 2012 to February 2014. Ms. Behrs joined Geron in November 1998 as Director of Corporate Development. Since then, she has also served in various managerial positions, including General Manager, R&D Technologies; Vice President, Corporate Development; Senior Vice President, Therapeutic Development, Oncology; and Senior Vice President, Strategic Portfolio Management. From 1990 to 1998, Ms. Behrs worked at Genetics Institute, Inc., a biotechnology research and development company, serving initially as Assistant Treasurer and then as Associate Director of Preclinical Operations where she was responsible for all business development, regulatory, and project management activities for the Preclinical Development function. Ms. Behrs received a B.S. from Boston College and an M.B.A. from Babson College.

Andrew J. Grethlein, Ph.D., has served as our Executive Vice President, Chief Operating Officer since January 2019. Previously, he served as our Executive Vice President, Development and Technical Operations, from July 2014 to January 2019. He joined Geron in September 2012 as our Executive Vice President, Technical Operations. Prior to joining Geron, Dr. Grethlein was Executive Vice President and Chief Operating Officer for Inspiration Biopharmaceuticals, a biopharmaceutical company, from January 2010 to September 2012. From October 2008 until January 2010, Dr. Grethlein was Senior Vice President of Biotechnology and Portfolio Management Team Leader for Hematology at Ipsen S.A., a global specialty pharmaceutical company. His responsibilities at Ipsen included planning and execution of worldwide strategy for product and portfolio development in the hematologic therapeutic area. From 2003 to 2008, Dr. Grethlein served as Senior Vice President of Pharmaceutical Operations at Tercica, Inc., an endocrinology-oriented biopharmaceutical company, where he was a member of the senior executive team that governed corporate strategy, business planning and company operations, and had responsibility for all manufacturing and quality functions. Before joining Tercica, Dr. Grethlein served in various positions at Elan Corporation, a biotechnology company, from 1997 to 2003, including as Senior Director, South San Francisco Pharmaceutical Operations. From 1995 to 1997, Dr. Grethlein served as Manager, Biologics Development and Manufacturing, for Athena Neurosciences, Inc., a pharmaceutical company. Prior to this, he served in various engineering positions for the Michigan Biotechnology Institute, a nonprofit technology research and business development corporation. Dr. Grethlein received his A.A. degree in liberal arts from Simon's Rock Early College, his B.S. in biology from Bates College, and his M.S. and Ph.D. in chemical engineering from Michigan State University.

Aleksandra Rizo, M.D., Ph.D., has served as our Executive Vice President, Chief Medical Officer since January 2019. Prior to joining Geron, Dr. Rizo was Executive Director, Strategy and Clinical Lead at Celgene Corporation, a biopharmaceutical company, from March 2018 to January 2019, where she led submission activities and participated in strategic and business development initiatives. From October 2008 to March 2018, Dr. Rizo served in a number of oncology drug development functions at Janssen Research and Development, LLC, a pharmaceutical company, including Senior Director, Compound Development Team Leader for all Phase 1 myeloid assets, and Global Clinical Leader for all late-stage myeloid assets, including imetelstat from November 2014 to March 2018, as well as Global Clinical Leader for the ibrutinib mantle cell lymphoma program. In these roles, she had oversight and leadership responsibilities for overall clinical development strategy, study designs, execution and data interpretation. In addition, Dr. Rizo was a core member of Janssen's Hematology Strategy Team where she participated and led diligence projects in hematology. During her initial tenure with Janssen, Dr. Rizo also worked on a variety of Velcade clinical trials in lymphoma and multiple myeloma. Dr. Rizo holds an M.D. from the University Ss Cyril and Methodius, Skopje, Macedonia, where she also completed a residency in internal medicine/hematology. She also has a Ph.D. in human leukemic stem cell biology from the University of Groningen, Groningen, Netherlands, and a Ph.D. in mouse stem cell biology from the University of Tokyo, Tokyo, Japan.

Stephen N. Rosenfield, J.D., has served as our Executive Vice President, Chief Legal Officer and Corporate Secretary since January 2019. Previously, he served as our Executive Vice President, General Counsel and Corporate Secretary from February 2012 to January 2019, General Counsel and Secretary since January 2012 and Secretary since October 2011. From July 2009 to February 2012, Mr. Rosenfield served as a consultant to private companies. From June 2004 until June 2009, Mr. Rosenfield held several positions at Tercica, Inc., an

endocrinology-oriented biopharmaceutical company, and through its acquisition by Ipsen, S.A. in October 2008, including General Counsel and Secretary. Prior to joining Tercica, Mr. Rosenfield served as the Executive Vice President of Legal Affairs, General Counsel and Secretary of InterMune, Inc., a biotechnology company that focused on pulmonology and fibrotic diseases. Prior to joining InterMune, Mr. Rosenfield was an attorney at Cooley LLP, an international law firm, where he served as outside counsel for biotechnology and technology clients. Mr. Rosenfield received a B.S. from Hofstra University and a J.D. from Northeastern University School of Law.

Employees

As of December 31, 2019, we had 45 full-time employees and 1 part-time employee. Four of our employees hold Ph.D. degrees and 19 hold other advanced degrees. Of this current total workforce, 24 employees were engaged in, or directly supported, our research and development activities, and 22 employees were engaged in business development, legal, finance and administration. None of our employees are covered by a collective bargaining agreement; nor have we experienced work stoppages. We consider relations with our employees to be good. We will need to maintain and continue to hire additional experienced personnel in clinical science, biostatistics, clinical operations, pharmacovigilance, quality, manufacturing, regulatory affairs, medical affairs and sales and marketing, in order to enable us to further develop and potentially commercialize imetelstat.

Corporate Information

Geron Corporation was incorporated in the State of Delaware on November 28, 1990.

Available Information

Our internet address is www.geron.com. Information included on our website is not part of this annual report on Form 10-K. We make available free of charge on our website our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and all amendments to those reports as soon as reasonably practicable after such material is electronically filed with or furnished to the United States Securities and Exchange Commission, or the SEC. In addition, copies of our annual reports are available free of charge upon written request.

ITEM 1A. RISK FACTORS

Our business is subject to various risks and uncertainties that may have a material adverse effect on our business, financial condition or results of operations. You should carefully consider the risks and uncertainties described below, together with all of the other information included in this annual report on Form 10-K. Our business faces significant risks and uncertainties, and those described below may not be the only risks and uncertainties we face. Additional risks and uncertainties not presently known to us or that we currently believe are immaterial may also significantly impair our business, financial condition or results of operations. If any of these risks or uncertainties occur, our business, financial condition or results of operations could suffer, the market price of our common stock could decline and you could lose all or part of your investment in our common stock.

RISKS RELATED TO THE DEVELOPMENT OF IMETELSTAT

Our future success depends solely on imetelstat, our only product candidate, and we cannot be certain that we will be able to continue to develop imetelstat or advance imetelstat to subsequent clinical trials, or that we will be able to receive regulatory approval for imetelstat on a timely basis, or at all.

Imetelstat is our sole product candidate, upon whose success we are wholly dependent. We do not have any other products or product candidates. Our ability to develop imetelstat to and through regulatory approval and potential commercial launch is subject to significant risks and uncertainties, including, among other things, our ability to:

- successfully recruit, enroll and retain patients in, and complete the Phase 3 portion of IMerge;
- obtain agreement from the United States Food and Drug Administration, or FDA, to any of our Phase 3 trial design proposals in MF, to support a potential regulatory approval path in MF, if any;

- proceed with further development of imetelstat in Phase 3 for MF, even if we obtain the agreement of the FDA on a Phase 3 trial design and/or feasible regulatory approval pathway in MF;
- obtain substantial additional capital in order to enable us to conduct our operations and to advance imetelstat to and through current and potential future clinical trials, including completing the Phase 3 portion of IMerge and commencing, conducting and completing potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies, as well as regulatory approval and potential commercial launch;
- develop clinical plans for, and successfully commence, enroll and complete, potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies;
- cause the INDs for imetelstat to be maintained without such INDs being placed on full or partial clinical hold by the FDA;
- generate sufficient safety and efficacy data from current and potential future clinical trials of imetelstat that provide a positive benefit-risk profile and support the continued and future development of imetelstat in hematologic myeloid malignancies;
- ascertain that the use of imetelstat does not result in significant systemic or organ toxicities, including hepatotoxicity, or other safety issues resulting in an unacceptable benefit-risk profile;
- collaborate successfully with clinical trial sites, academic institutions, clinical research organizations, or CROs, contractors, physician investigators and other third parties;
- obtain and maintain required regulatory clearances and approvals for imetelstat; for example, it is uncertain:
  - whether the FDA and regulatory authorities in other countries will require us to obtain and submit additional non-clinical, manufacturing, or clinical data to proceed with any potential future clinical trials,
  - how the FDA and other regulatory authorities will interpret safety and efficacy data from any clinical trial, including from IMbark or IMerge,
  - what scope and type of clinical development and other data will be required before the FDA and other regulatory authorities might grant us marketing approval, if any, and
  - what the length of time and cost for us will be to complete any such requirements;
- enter into and maintain arrangements with third parties to provide services needed to further research and develop imetelstat, including maintaining the agreement with our CROs, or to manufacture imetelstat, in each case at commercially reasonable costs;
- enter into and maintain arrangements with third parties, or establish internal capabilities, to provide sales, marketing, distribution and other commercialization functions in compliance with applicable laws;
- obtain appropriate coverage and reimbursement levels for the cost of imetelstat from governmental authorities, private health insurers and other third-party payors;
- obtain, maintain and enforce adequate intellectual property protection for imetelstat; and
- recruit and retain personnel to support the development and potential commercialization of imetelstat, including completion of the Phase 3 portion of IMerge and potential clinical development of imetelstat in other indications and commercial resources to launch imetelstat.

If we are not able to successfully achieve the above-stated goals and overcome other challenges that we may encounter in the research, development, manufacturing and potential commercialization of imetelstat, we may be forced to abandon our development of imetelstat, which would severely harm our business and prospects, and might cause us to cease operations.

Completion of current clinical trials of imetelstat, including the Phase 3 portion of IMerge, and commencement of potential future clinical trials of imetelstat could be interrupted, further delayed or abandoned for a variety of reasons.

Currently, the ongoing clinical trials of imetelstat are the Phase 2 and Phase 3 portions of IMerge. Completion of these clinical trials, and the commencement of any potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies, could be interrupted, delayed or abandoned for a variety of reasons, including as a result of failures or delays in:

- demonstrating sufficient safety and efficacy of imetelstat in current and potential future clinical trials, without safety issues, side effects or dose-limiting toxicities, including any additional or more severe safety issues in addition to those that have been observed to date in previous or ongoing clinical trials related to imetelstat, whether or not in the same indications or therapeutic areas;
- obtaining and/or maintaining regulatory clearances in the United States or other countries to conduct clinical trials, such as obtaining or maintaining regulatory clearances to commence, conduct or modify current or potential future clinical trials of imetelstat, in a timely manner, or at all, which could, for example, prevent us from, or result in substantial delays in, conducting or completing the Phase 3 portion of IMerge, and even if such regulatory clearances are obtained, we may be unable to commence, conduct or complete current or potential future clinical trials of imetelstat, or may discontinue such trials, whether due to our inability to raise substantial additional capital or otherwise;
- maintaining the INDs for imetelstat without such INDs being placed on full or partial clinical hold, suspended or subject to other requirements by the FDA or other regulatory authorities;
- properly (i) completing the Phase 2 portion of IMerge, including assessing the durability of RBC-TI responses; and (ii) recruiting, enrolling, conducting and completing the Phase 3 portion of IMerge, and promptly or adequately reporting data from such trials;
- obtaining funding on commercially reasonable terms necessary to advance the development of imetelstat, including completing the Phase 3 portion of IMerge, and commencing, conducting and completing potential future clinical trials of imetelstat in other indications, such as potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies;
- determining a feasible registration path, if any, for late-stage development of imetelstat in MF, after submitting to the FDA Phase 3 trial design proposals in MF and conducting further discussions with the FDA regarding a potential regulatory approval path, if any;
- obtaining or accessing necessary clinical data in accordance with appropriate clinical or quality practices to ensure complete data sets;
- responding to safety findings by the data review committees of current clinical trials, and safety or futility findings by the data review committees of potential future clinical trials of imetelstat, based on emerging data occurring during such clinical trials, such as significant systemic or organ toxicities, including severe cytopenias, hepatotoxicity, fatal bleeding with or without any associated thrombocytopenia, patient injury or death, or other safety issues, resulting in an unacceptable benefit-risk profile;
- manufacturing sufficient quantities of imetelstat, or other clinical trial materials, in a manner that meets the quality standards of the FDA and other regulatory authorities, and responding to any disruptions to drug supply, clinical trial materials or quality issues that may arise;
- ensuring the ability to manufacture and supply imetelstat at acceptable costs for potential Phase 3 clinical trials and commercialization;
- obtaining sufficient quantities of any study-related treatments, materials (including comparator products, placebo or combination therapies) or ancillary supplies;
- obtaining acceptance by regulatory authorities of any manufacturing changes for imetelstat, as well as successfully implementing any such manufacturing changes;

- complying with current and future regulatory requirements, policies or guidelines, including domestic and international laws and regulations pertaining to fraud and abuse, transparency, and the privacy and security of health information;
- reaching agreement on acceptable terms and on a timely basis, if at all, with collaborators and vendors located in the United States or foreign jurisdictions, including our CROs, laboratory service providers and clinical trial sites, on all aspects of clinical development;
- obtaining timely review and clearances by regulatory authorities for any clinical protocol amendments or modifications to our manufacturing process which may be sought for current and potential future clinical trials of imetelstat, including responding to questions or comments from these authorities in a timely and adequate manner, which could, for example, prevent us from conducting or completing the Phase 3 portion of IMerge, potential Phase 3 clinical trials in MF, or potential proof-of-concept studies in other hematologic myeloid malignancies; and
- obtaining institutional review board or ethics committee approvals for clinical trial protocols or protocol amendments, including any future refinements to the trial design we may seek for the Phase 3 portion of IMerge, which could, for example, prevent us from conducting or completing the Phase 3 portion of IMerge, potential Phase 3 clinical trials in MF, or potential proof-of-concept studies in other hematologic myeloid malignancies.

Failures or delays with respect to any of these events could adversely affect our ability to conduct or complete any current clinical trials of imetelstat, including the Phase 3 portion of IMerge, or commence, conduct and complete potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies, which could increase development costs, or interrupt, further delay or halt our development or potential commercialization of imetelstat, any of which could severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

If we encounter difficulties enrolling or retaining patients in clinical trials of imetelstat, including in the Phase 3 portion of IMerge, clinical development and commercialization activities could be further delayed or otherwise adversely affected, which would cause our business and business prospects to be severely harmed, and we might cease operations.

The timely completion of a clinical trial in accordance with its protocol depends, among other things, on the ability to enroll a sufficient number of patients who remain in the trial until its conclusion. For example, if we encounter challenges in screening, enrolling and retaining patients in the Phase 3 portion of IMerge, our completion of the Phase 3 portion of IMerge may be delayed or discontinued. If we experience difficulties in retaining patients in the treatment or follow-up phase of the Phase 2 portion of IMerge, our ability to continue to assess longer-term durability of RBC-TI responses would be adversely affected. The enrollment and retention of patients in clinical trials of imetelstat, including the Phase 3 portion of IMerge, depends on many factors, such as:

- our ability to identify and screen patients who meet the patient eligibility criteria specified in the protocol;
- the size of the patient population required for analysis of the trial's primary endpoint;
- the proximity of patients to trial sites;
- the design of the trial, including potential patients' reluctance to participate in the trial due to the possibility of being assigned to a placebo control arm;
- our ability to recruit and retain clinical trial investigators with the appropriate competencies and experience;
- clinicians' and patients' perceptions of the potential advantages of imetelstat, both in relation to other available therapies, including any new drugs that may be approved for the indications being investigated, and as a result of data reported from previous or current clinical trials of imetelstat, and their willingness to participate in clinical trials of imetelstat;
- the ability to obtain and maintain patient consents; and

- the risk that patients enrolled in any imetelstat clinical trial will drop out of the trial before completion due to lack of efficacy, adverse side effects, investigator decision, progressive disease, slow progress to later stage clinical trials, perceptions based on the decision by Janssen Biotech, Inc., or Janssen, to terminate the Collaboration and License Agreement, or Collaboration Agreement, alternate treatments being approved for the indication, or personal issues.

In addition, current and potential future clinical trials of imetelstat, such as the Phase 3 portion of IMerge, will compete with other clinical trials for product candidates that are in the same therapeutic areas with imetelstat and such trials may also be conducted at the same clinical sites. This competition will reduce the number and type of patients available to enroll or remain in current and potential future imetelstat clinical trials. Moreover, because imetelstat represents a departure from more commonly used methods for cancer treatment, potential patients and their doctors may be inclined to use conventional therapies, rather than enroll patients into imetelstat clinical trials, or may decide not to enroll, or may not recommend enrollment, in clinical trials of imetelstat, including the Phase 3 portion of IMerge, based on efficacy and safety results reported to date and that may be reported in the future.

Delays in patient enrollment or the inability to retain or treat patients could result in increased costs, lead to incomplete data sets, or adversely affect the timing or outcome of current and potential future clinical trials of imetelstat, such as the Phase 3 portion of IMerge, which could prevent completion of these trials and adversely affect the clinical development and potential commercialization of imetelstat. Such occurrences would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

Imetelstat may cause, or have attributed to it, undesirable or unintended side effects or other adverse events that could further delay or prevent the commencement and/or completion of clinical trials for imetelstat, further delay or prevent its regulatory approval, or limit its commercial potential.

Imetelstat may cause, or have attributed to it, undesirable or unintended side effects or other adverse events affecting its safety or efficacy that could interrupt, further delay or halt current or potential future clinical trials of imetelstat, such as the Phase 3 portion of IMerge. For example, adverse events and dose-limiting toxicities observed in previous and ongoing clinical trials of imetelstat include:

- hematologic toxicities, such as profound and/or prolonged thrombocytopenia or neutropenia, including one case of febrile neutropenia after prolonged myelosuppression with intracranial hemorrhage resulting in patient death, which the investigator assessed as possibly related to imetelstat;
- bleeding events, with or without thrombocytopenia;
- hepatotoxicity, such as liver function test, or LFT, abnormalities, the clinical significance and long-term consequences of which are currently undetermined, and hepatic failure;
- gastrointestinal events;
- infections;
- muscular and joint pain;
- fatigue;
- headache, and
- infusion-related reactions.

If patients in any clinical trials of imetelstat, including the Phase 2 and Phase 3 portions of IMerge, potential Phase 3 clinical trials in MF, or potential proof-of-concept studies in other hematologic myeloid malignancies, experience similar or more severe adverse events, or new or unusual adverse events, or if the FDA or other regulatory authorities determine that efficacy and safety data in current or potential future clinical trials of imetelstat do not support an adequate benefit-risk profile to justify continued treatment of patients, then the FDA or other regulatory authorities may again place the INDs for imetelstat on clinical hold, as occurred in March 2014.

Further, clinical trials by their nature examine the effect of a potential therapy in a sample of the potential future patient population. As such, clinical trials conducted with imetelstat, to date and in the future, may not uncover all possible adverse events that patients treated with imetelstat may experience. Because remaining patients in the treatment phase of the Phase 2 portion of IMerge and patients in the Phase 3 portion of IMerge continue to receive imetelstat treatment, additional or more severe toxicities or safety issues, including additional serious adverse events and dose-limiting toxicities, may be observed as patient treatment continues and more data become available. In addition, since additional data are being generated from the Phase 2 and Phase 3 portions of IMerge, the benefit-risk profile of imetelstat will continue to be assessed, including the risk of hepatotoxicity, severe cytopenias, fatal bleeding with or without any associated thrombocytopenia, patient injury or death, and any other severe adverse effects that may be associated with life-threatening clinical outcomes. If such toxicities or other safety issues in any clinical trial of imetelstat are determined by us, the FDA or any other regulatory authority to result in an unacceptable benefit-risk profile, then:

- additional information supporting the benefit-risk profile of imetelstat may be requested by the FDA or other regulatory authorities and if any such information supplied by us, or by Janssen, is not deemed acceptable, current clinical trials of imetelstat could be suspended, terminated, or placed on clinical hold by the FDA or other regulatory authorities;
- the ability to retain enrolled patients in current clinical trials may be negatively affected, resulting in incomplete data sets and the inability to adequately assess the benefit-risk profile of imetelstat in a specific patient population; or
- additional, unexpected clinical trials or non-clinical studies may be required to be conducted.

The occurrence of any of these events could interrupt, further delay, or halt, any development and potential commercialization of imetelstat by us, which would have a severe adverse effect on our results of operations, financial condition, business prospects and the future of imetelstat, any of which might cause us to cease operations.

Results and data we disclosed from prior non-clinical studies and clinical trials may not predict success in later clinical trials, and we cannot assure you that any ongoing or future clinical trials of imetelstat will lead to similar results and data that could potentially enable us to obtain any regulatory approvals.

Success in non-clinical testing and early clinical trials does not ensure that later clinical trials will be successful, nor does it predict final clinical trial results. We cannot be certain that any of the prior, current or potential future clinical trials of imetelstat will generate sufficient, consistent or adequate efficacy and safety data demonstrating a positive benefit-risk profile, which would be necessary to obtain regulatory approval to market imetelstat in any indication. Imetelstat in later stages of clinical trials may fail to show the desired benefit-risk profile despite having progressed through non-clinical studies and initial clinical trials. Many companies in the biopharmaceutical industry have frequently suffered significant setbacks in later clinical trials, even after achieving promising results in earlier non-clinical studies or clinical trials.

A trial design that is considered appropriate for regulatory approval includes a sufficiently large sample size with appropriate statistical power, as well as proper control of bias, to allow a meaningful interpretation of the results. The preliminary results of imetelstat clinical trials with smaller sample sizes can be disproportionately influenced by the impact the treatment had on a few individuals, which limits the ability to generalize the results across a broader community, making the trial results less reliable than trials with a larger number of patients. As a result, there may be less certainty that imetelstat would achieve a statistically significant effect in any future clinical trials. For example, in the Phase 2 portion of IMerge, the initial data review for the 25-patient expansion cohort that was conducted by Janssen in the second quarter of 2018, which Janssen called a "data snapshot," exhibited 8-week RBC-TI rate of 28%, while the 13-patient initial cohort exhibited 8-week RBC-TI rate of 54% resulting in an overall 8-week RBC-TI rate of 37% for the combined cohorts. Patients in both the initial and expansion cohorts were naïve to both HMA and lenalidomide and were non-del(5q). We believe the observed difference in 8-week RBC-TI rate between the 13-patient initial cohort and the 25-patient expansion cohort may be attributable to factors such as the maturity of the data at the time of the data snapshot since the median follow-up time of the expansion cohort at the time of the data snapshot was less than half the length of time the 13-patient initial cohort had been followed when their data were first reported, or the higher overall baseline transfusion burden of the expansion cohort. Although the latest reported 8-week RBC-TI rate in June 2019 is higher than that reported in the data snapshot from the second

quarter of 2018, we cannot assure you that the 8-week RBC-TI rate reported for the combined cohorts in the Phase 2 portion of IMerge will improve further with longer follow-up, or at all, or that the 8-week RBC-TI rate of patients enrolled in the Phase 3 portion of IMerge will be comparable to what has been reported in the 13-patient initial cohort, the 25-patient expansion cohort, or the combined cohorts in the Phase 2 portion of IMerge. In general, Phase 3 clinical trials with larger numbers of patients or longer durations of therapy may fail to replicate efficacy results observed in earlier clinical trials, or may reveal safety concerns that were not identified in smaller or shorter trials, any of which could adversely affect future development prospects of imetelstat.

In addition, non-clinical and clinical data are often susceptible to varying interpretations and analyses. In some instances, there can be significant variability between different clinical trials of imetelstat due to numerous factors, including changes in trial procedures set forth in trial protocols, differences in the size and type of patient populations, and changes in and adherence to the dosing regimens. For example, complete and partial remissions were observed in the pilot study of imetelstat conducted at Mayo Clinic, or the Pilot Study. However, similar activity was not observed in the MF patients enrolled in IMbark, as shown by the one partial remission observed in the IMbark primary analysis. We believe that differences in the IMbark study design when compared to the Pilot Study design, such as more restrictive patient enrollment criteria requiring either documented objective lack of response to a JAK inhibitor or evidence of progressive disease while on treatment with a JAK inhibitor, may have contributed to the data observed in IMbark differing significantly from data reported from the Pilot Study, but we cannot assure you that any future clinical trials of imetelstat in MF will yield results comparable to IMbark or the Pilot Study. In addition, the potential improvement in survival observed in the 9.4 mg/kg dosing arm in IMbark will need to be further assessed in a Phase 3 clinical trial comparing imetelstat to a control therapy, and similar results, including potential improvement in survival, if any, with respect to any patient population or patient population subgroup, may not be observed. Likewise, although the statistical analyses comparing IMbark data to closely matched real-world data, or RWD, reported at the EHA Annual Congress meeting in June 2019, suggest favorable overall survival for imetelstat-treated relapsed/refractory MF patients compared to best available therapy using closely matched patients' RWD, such comparative analyses between RWD and our clinical trial data have several limitations. For instance, the analyses create a balance between treatment groups with respect to commonly available covariates, but do not take into account the unmeasured and unknown covariates that may affect the outcomes of the analyses. Potential biases are introduced by factors which include, for example, the selection of the patients included in the analyses, misclassification in the matching process, the small sample size, and estimates that may not represent the outcomes for the true treated patient population. For these and other reasons, such comparative analyses and any conclusions from such analyses should be considered carefully and with caution, and should not be relied upon as demonstrative or otherwise predictive or indicative of any future clinical trial results of imetelstat in relapsed/refractory MF.

Failure to achieve positive results in current or potential future imetelstat clinical trials would interrupt, further delay, or halt, any development and potential commercialization of imetelstat by us, which would have a severe adverse effect on our results of operations, financial condition, business prospects and the future of imetelstat, any of which might cause us to cease operations.

Interim, "snapshot," "top-line," and preliminary data or statistical analyses from clinical trials that we announce or publish from time-to-time may change as more patient data become available, may not be similar to the final data, and are subject to audit and verification procedures that could result in material changes in the final data. Thus, such preliminary data should be considered carefully and with caution and not relied upon as indicative of future clinical results.

From time-to-time, preliminary or interim safety and efficacy data from previous and current imetelstat clinical trials have been reported or announced by us, clinical investigators or our prior collaboration partner(s). For example, preliminary data from the Phase 2 portion of IMerge were reported at the ASH Annual Meetings in December 2017 and December 2018, and at the EHA Annual Congress meetings in June 2018 and June 2019. We expect similar reports or announcements of safety and efficacy data from us or clinical investigators as data matures in current imetelstat clinical trials and from potential future clinical trials. Preliminary or interim results may not be reproduced in any potential future clinical trials of imetelstat, and thus should be considered carefully and with caution, and not relied upon as indicative of future clinical results. Material adverse differences in final data, compared to preliminary or interim data, could severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

Additional or updated safety and efficacy data from current or potential future imetelstat clinical trials may result in a benefit-risk profile that does not justify the continued development of imetelstat in a particular patient population, or at all. For example, because patients remaining in the treatment phase continue to receive imetelstat in the Phase 2 portion of IMerge, efficacy and safety data continue to be generated from the trial and will continue to evolve until all patients have ceased treatment. More mature data that may be reported from the Phase 2 portion of IMerge and any data in the Phase 3 portion of IMerge in the future may materially differ from data previously reported in IMerge, including with respect to the data previously reported from the initial and expansion cohorts in the Phase 2 portion of IMerge. Thus, the reported data should be considered carefully and with caution, and not relied upon as indicative of future clinical results. Such additional data could result in a lower benefit-risk profile than initially expected, which could hinder the enrollment, completion and potential success of the Phase 3 portion of IMerge, or could cause us to abandon further development of imetelstat entirely.

The research and development of imetelstat is subject to numerous risks and uncertainties.

The science and technology of telomere biology, telomerase and our proprietary oligonucleotide chemistry are relatively new. There is no precedent for the successful commercialization of a therapeutic product candidate based on these technologies. Significant research and development activities will be necessary to further develop imetelstat, which is our sole product candidate, which may take years to accomplish, if at all.

Because of the significant scientific, regulatory and commercial challenges that must be overcome to successfully research, develop and commercialize imetelstat, the development of imetelstat in hematologic myeloid malignancies, including MF and MDS, or any other indications, may be further delayed or abandoned, even after significant resources have been expended on it. Examples of such situations include:

- in September 2012, the discontinuation of our Phase 2 clinical trial of imetelstat in metastatic breast cancer;
- in April 2013, the discontinuation of our development of imetelstat in solid tumors with short telomeres;
- in the third quarter of 2016, closure of the 4.7 mg/kg dosing arm in IMbark to new patient enrollment and suspension of enrollment in the 9.4 mg/kg dosing arm in IMbark because an insufficient number of patients in the 9.4 mg/kg dosing arm met the protocol defined interim efficacy criteria at 12 weeks;
- in the third quarter of 2017, expansion of the Phase 2 portion of IMerge to enroll additional lower risk MDS patients in a target patient population; and
- in September 2018, Janssen's decision to terminate the Collaboration Agreement.

Further delay, suspension or abandonment of the development of imetelstat in hematologic myeloid malignancies, including resulting from our inability to successfully conduct and complete the Phase 3 portion of IMerge, and to plan for, commence, conduct and complete potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies, could have a material adverse effect on the future of imetelstat and our business prospects, and we might cease operations.

We have limited experience as a company in conducting large-scale, late-stage clinical trials, such as the Phase 3 portion of IMerge or potential future similar trials, and no prior experience as a company in those functional areas that would be required for the successful commercialization of our sole product candidate, imetelstat.

Although we recently have hired individuals who have experience conducting Phase 3 clinical trials, as a company we have limited experience in conducting large-scale, late-stage clinical trials, such as the Phase 3 portion of IMerge. We cannot be certain that we will be able to enroll, conduct or complete the Phase 3 portion of IMerge, or any other future large-scale, late-stage clinical trial of imetelstat, in a timely fashion, or at all. Large-scale, late-stage clinical trials will require additional financial resources and certain internal development experience that we are developing, as well as increased reliance on third-party clinical investigators, CROs, service providers, vendors, suppliers and consultants. Relying on these third parties and establishing effective and collaborative relationships with them to conduct large-scale, late-stage clinical trials may cause further delays that are outside of our control. Any such further delays could have a material adverse effect on our business.

We do not have experience as a company with activities that would be required for the commercialization of imetelstat, should we receive future regulatory approval to do so. Developing an internal sales, marketing and distribution capability is an expensive and time-consuming process, and will require additional management expertise. We may not be able to negotiate and enter into third-party marketing and distribution agreements on terms that are economically attractive, or at all. Even if we do enter into such agreements, third-party marketers and distributors may not successfully market or distribute our sole product candidate, imetelstat.

Our inability to successfully plan, commence, enroll, conduct and complete large-scale, late-stage clinical trials, such as the Phase 3 portion of IMerge or future similar trials, or to successfully establish commercialization capabilities for imetelstat if we receive future regulatory approval to do so, would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

We rely on third parties to conduct our current and potential future clinical trials of imetelstat. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, we may be unable to continue the development of, obtain regulatory approval for, or commercialize imetelstat.

We do not have the ability to independently conduct clinical trials. Therefore, we rely on medical institutions, clinical investigators, contract laboratories and other third parties, such as CROs, service providers, vendors, suppliers and consultants, to conduct clinical trials of imetelstat. The third parties with whom we contract for execution of our current and potential future clinical trials of imetelstat play a critical role in the conduct of these trials and the subsequent collection and analysis of data. However, these third parties are not our employees, and except for contractual duties and obligations, we have limited ability to control their performance, or the amount or timing of resources that they devote to imetelstat. For example, we have retained CROs to support our imetelstat clinical development activities, including the Phase 3 portion of IMerge, and any failure by our CROs to perform their contractual obligations, or disputes with our CROs about the quality of their performance or other matters, could prevent us from enrolling, conducting or completing the Phase 3 portion of IMerge, or could otherwise further delay or halt our imetelstat clinical development activities. These third parties may also have relationships with other commercial entities, some of which may compete with us. Under certain circumstances, these third parties may terminate their agreements with us without cause and upon immediate written notice.

Although we rely on third parties to conduct any imetelstat clinical trials, including the Phase 3 portion of IMerge, we remain responsible for ensuring that each clinical trial is conducted in accordance with its investigational plan and protocol. Moreover, the FDA and foreign regulatory authorities require us to comply with regulations and standards, including regulations commonly referred to as good clinical practices, or GCPs, for conducting, monitoring, recording and reporting the results of clinical trials to ensure that the data and results are scientifically credible and accurate, and that patients are adequately informed of the potential risks of participating in clinical trials. Our ability to comply with these regulations and standards is contingent upon activities conducted by third parties, and if they fail to perform in accordance with contractual obligations and legal requirements, our development of imetelstat may be interrupted, further delayed or halted, which would have a severe adverse effect on our results of operations, financial condition, business prospects and the future of imetelstat, any of which might cause us to cease operations.

In addition, the execution of clinical trials and the subsequent compilation and analysis of the data produced, requires coordination among various parties. In order for these functions to be carried out effectively and efficiently, it is imperative that these parties communicate and coordinate with one another. If the quality or accuracy of the clinical data obtained, compiled or analyzed by third parties is compromised due to their failure to adhere to our clinical trial protocols or GCPs, or for any other reason, we may need to enter into new arrangements with alternative third parties, which would cause delay, and could be difficult, costly or impossible. If third parties conducting our clinical trials do not perform their contractual duties or obligations, experience work stoppages, do not meet expected deadlines, terminate their agreements with us or need to be replaced, our clinical trials may be extended, delayed or terminated, or may be unsuccessful or need to be repeated, which could have a material adverse effect on our business and might cause us to cease operations.

RISKS RELATED TO TRANSITION OF THE IMETELSTAT PROGRAM TO GERON

Poor performance by Janssen of the imetelstat program prior to its transition to us, or lack of cooperation following its transition to us, could severely and adversely affect imetelstat's future value and our business and business prospects, and might cause us to cease operations.

Although transition of the imetelstat program to us was completed by the end of September 2019, risks to our ability to develop imetelstat related to our past collaboration remain, including:

- disputes may arise concerning the achievement of development, regulatory and commercial objectives, or our license to the proprietary rights, which may result in costly litigation or arbitration that diverts our management's attention and resources;
- we may become aware of errors or deficiencies in the conduct of the imetelstat program prior to its transition to us, and/or in the transition of the imetelstat program to us, which could adversely impact our future development of imetelstat;
- Janssen may refuse to provide, or may be unable to provide, information requested by the FDA or other regulatory authorities regarding the time period when Janssen was responsible for the imetelstat program;
- failure to comply with applicable regulatory guidelines prior to our assumption of sponsorship of the imetelstat program could result in administrative or judicially imposed sanctions on us, including warning letters, civil and criminal penalties, injunctions, product seizures or detention, product recalls, total or partial suspension of manufacturing activities, and the potential refusal to approve any new drug applications;
- our ability to maintain the INDs for imetelstat and to submit required regulatory reports within required timelines may be compromised if all data and information from the imetelstat program, including IMbark and IMerge, was not fully transferred to us; and
- Janssen may not properly maintain or defend intellectual property rights that we have licensed, may use our proprietary information in such a way as to cause disputes that could jeopardize or invalidate our proprietary information or expose us to potential litigation, or may disclose our proprietary information in a manner that could put our intellectual property rights at risk.

The occurrence of any of these events could severely and adversely affect imetelstat's future value and our business and business prospects, and might cause us to cease operations.

RISKS RELATED TO REGULATORY COMPLIANCE MATTERS AND COMMERCIALIZATION OF IMETELSTAT

Our inability to maintain regulatory clearances and approvals to continue the clinical development of, and to potentially commercialize, imetelstat, would severely and adversely affect imetelstat's future value and our business and business prospects, and might cause us to cease operations.

Federal, state and local governments in the United States and governments in other countries have significant regulations in place that govern drug research and development and may prevent us from successfully conducting development efforts or potentially commercializing imetelstat. Delays in obtaining or failure to maintain regulatory clearances and approvals or limitations in the scope of such clearances or approvals could:

- impede or halt our activities and plans for clinical development and commercialization;
- significantly harm the commercial potential of imetelstat;
- impose additional development costs;
- diminish any competitive advantages that may have been available to us; or
- further delay or preclude any revenue we may receive from the future commercialization of imetelstat, if any.

Before we can seek to obtain regulatory approval for the commercial sale of imetelstat, multiple clinical trials, including larger-scale Phase 3 clinical trials, will need to be conducted to demonstrate if imetelstat is safe and effective for use in a diverse population. We expect significant additional research, manufacturing activities and clinical testing to be required before we can file any application with the FDA or other regulatory authorities for regulatory approval of imetelstat. As such, we do not expect imetelstat to be commercially available for many years, if at all. Our clinical development program for imetelstat may not lead to regulatory approval from the FDA and similar foreign regulatory authorities if we fail to demonstrate that imetelstat is safe and effective. If imetelstat cannot be successfully developed in clinical trials, including in the Phase 3 portion of IMerge, our business and business prospects would be severely and adversely affected, and we might cease operations. Even if we do successfully complete one or more clinical trials of imetelstat in hematologic myeloid malignancies, including the Phase 3 portion of IMerge, those results are not necessarily predictive of results of future pivotal trials that may be needed before we may submit a New Drug Application, or NDA, to the FDA for the initial or other future indications. We may therefore fail to further develop or commercialize imetelstat, which would severely and adversely affect our business and business prospects, and might cause us to cease operations.

Obtaining potential future regulatory clearances to market imetelstat in the United States and other countries is a costly and lengthy process, and we cannot predict when or if regulatory authorities will approve imetelstat for commercial sale.

The process of obtaining marketing approvals, both in the United States and abroad, is lengthy, expensive and uncertain. It may take many years, if approval is obtained at all, and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the product candidates involved. Securing marketing approval requires the submission of extensive non-clinical and clinical data and supporting information to regulatory authorities for each therapeutic indication to establish the product candidate's safety and efficacy. Securing marketing approval also requires the submission of information about the product manufacturing process to, and inspection of manufacturing facilities by, the regulatory authorities. The FDA or other regulatory authorities may determine that imetelstat is not safe and effective, only moderately effective or has undesirable or unintended side effects, toxicities or other characteristics that preclude us from obtaining marketing approval or prevent or limit imetelstat's commercial use. Any marketing approval we ultimately obtain may be limited or subject to restrictions or post-approval commitments that render imetelstat not commercially viable. We do not expect imetelstat to be approved for commercial sale for many years, if at all.

In addition, changes in marketing approval policies during the development period, changes in or the enactment or promulgation of additional statutes, regulations or guidance, or changes in regulatory review for a submitted product application, may cause delays in the approval or rejection of an application. Regulatory authorities have substantial discretion in the approval process and may refuse to accept any application or may decide that our data are insufficient for approval and require additional non-clinical, clinical or other studies. The FDA and regulatory authorities in other countries will assess the overall benefit-risk profile of imetelstat, and may conclude that the overall benefit-risk profile of imetelstat does not merit approval of imetelstat for marketing or further development for any indication. Varying interpretations of the data obtained from non-clinical and clinical testing could delay, limit or prevent marketing approval of imetelstat which would harm imetelstat's future value and our business and business prospects.

Imetelstat must receive all relevant regulatory approvals before it may be marketed in the United States or other countries. Obtaining regulatory approval is a lengthy, expensive and uncertain process. For example, following the result of a referendum in 2016, the United Kingdom left the European Union on January 31, 2020, commonly referred to as Brexit. Pursuant to the formal withdrawal arrangements agreed between the United Kingdom and the European Union, the United Kingdom will be subject to a transition period until December 31, 2020, during which EU rules will continue to apply. Negotiations between the United Kingdom and the European Union are expected to continue in relation to the customs and trading relationship between the United Kingdom and the European Union after December 31, 2020. Although the impact of the withdrawal of the United Kingdom from the European Union will not be known for some time, this could lead to a period of considerable uncertainty in relation to the regulatory process in Europe, which could result in a delay in the review of regulatory submissions made in Europe by biotechnology and pharmaceutical companies, including potentially by us in the future, and could also lead to less efficient, more expensive, and potentially lengthier regulatory review processes for companies like us, who may seek to obtain regulatory approval for drug products in the European Union or the United Kingdom. Such regulatory

changes in the United Kingdom or elsewhere could adversely affect and/or delay our ability to obtain approval of, and market and sell, imetelstat in the United States or other countries.

Regulatory agencies may also not approve the labeling claims that are necessary or desirable for the successful commercialization of a drug, such as imetelstat. For example, future regulatory clearances, if any, that we might obtain for imetelstat may be limited to fewer or narrower indications than we might request, or may be granted subject to the performance of post-marketing studies. Future regulatory clearances, if any, may be limited to a smaller patient population, or may require a different drug formulation or a different manufacturing process, than we might in the future decide to seek.

Any delay in obtaining or failure to obtain required approvals of imetelstat, or limitations on any regulatory approval that we might receive in the future, if any, could reduce the potential commercial use of imetelstat, and potential market demand for imetelstat and therefore result in decreased revenue for us from any commercialization of imetelstat, any of which would severely and adversely affect our financial results, the price of our common stock, our business and business prospects, and the future of imetelstat, and might cause us to cease operations.

Although orphan drug designation has been granted to imetelstat for the treatment of MF and MDS, these designations may not be maintained, which would eliminate the benefits associated with orphan drug designation, including the potential for market exclusivity, which would likely result in decreased sales revenue from commercialization of imetelstat, if any, and would likely harm our business and business prospects.

The FDA granted orphan drug designation to imetelstat in June 2015 for the treatment of MF and for the treatment of MDS in December 2015, and the European Medicines Agency, or EMA, granted it in December 2015 for the treatment of MF. The designation of imetelstat as an orphan drug does not guarantee that any regulatory authority will accelerate regulatory review of, or ultimately approve, imetelstat, nor does it limit the ability of any regulatory authority to grant orphan drug designation to product candidates of other companies that treat the same indications as imetelstat prior to imetelstat receiving any exclusive marketing approval.

We may lose orphan drug exclusivity if the FDA or EMA determines that the request for orphan drug designation was materially defective or if we cannot ensure sufficient quantities of imetelstat to meet the needs of patients with MF or MDS.

Even if we maintain orphan drug exclusivity for imetelstat, the exclusivity may not effectively protect imetelstat from competition because different drugs with different active moieties can be approved for the same condition. Even after an orphan drug product is approved, the FDA or EMA can subsequently approve a different drug with the same active moiety for the same condition, if the FDA or EMA concludes that the later drug is safer, more effective, or makes a major contribution to patient care. The occurrence of any of these events could result in decreased sales of imetelstat, should it ever receive marketing approval, and may harm our business and business prospects. In addition, orphan drug designation will neither shorten the development time nor regulatory review time for imetelstat, and does not give imetelstat any advantage in the regulatory review or approval process.

A Fast Track designation by the FDA, such as the Fast Track designations received for imetelstat for MDS and relapsed/refractory MF, does not guarantee approval and may not lead to a faster development, regulatory review or approval process.

In October 2017, the FDA granted Fast Track designation for the imetelstat clinical development program for the treatment of adult patients with transfusion-dependent anemia due to Low or Intermediate-1 risk MDS who are non-del(5q) and who are refractory or resistant to treatment with an erythropoiesis stimulating agent. In September 2019, the FDA granted Fast Track designation for the development of imetelstat for adult patients with Intermediate-2 or High-risk MF whose disease has relapsed after or is refractory to JAK inhibitor treatment.

Fast Track designation provides opportunities for frequent interactions with FDA review staff, as well as eligibility for priority review, if relevant criteria are met, and rolling review. Fast Track designation is intended to facilitate and expedite development and review of an NDA to address unmet medical needs in the treatment of serious or life-threatening conditions. However, Fast Track designation does not accelerate conduct of clinical trials

or mean that the regulatory requirements are less stringent, nor does it ensure that imetelstat will receive marketing approval or that approval will be granted within any particular timeframe. In addition, the FDA may withdraw Fast Track designation for any indication if it believes that the designation is no longer supported by data emerging from the imetelstat clinical development program.

Failure to achieve continued compliance with government regulations could delay or halt potential commercialization of imetelstat.

Approved products and their manufacturers are subject to continual review, and discovery of previously unknown problems with a product or its manufacturer may result in restrictions on the product or manufacturer, including import restrictions, seizure and withdrawal of the product from the market. If approved for commercial sale, future sales of imetelstat will be subject to government regulation related to numerous matters, including the processes of:

- manufacturing;
- advertising and promoting;
- selling and marketing;
- labeling; and
- distribution.

If, and to the extent that, we are unable to comply with these regulations, our ability to earn potential revenue from the commercialization of imetelstat, if any, would be materially and adversely impacted.

Failure to comply with regulatory requirements can result in severe civil and criminal penalties, including but not limited to:

- recall or seizure of products;
- injunctions against the import, manufacture, distribution, sales and/or marketing of products; and
- criminal prosecution.

The imposition of any of these penalties or other commercial limitations would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

RISKS RELATED TO OUR FINANCIAL POSITION AND NEED FOR ADDITIONAL FINANCING

Our failure to obtain additional capital would force us to further delay, reduce or eliminate development of imetelstat, including the Phase 3 portion of IMerge, potential Phase 3 clinical trials in MF, and potential proof-of-concept studies in other hematologic myeloid malignancies, and our potential future imetelstat commercialization efforts, any of which would severely and adversely affect our financial results, business and business prospects, and might cause us to cease operations.

Successful drug development and commercialization requires significant amounts of capital. In this regard, we believe that our existing capital resources and future interest income is sufficient to continue the IMerge Phase 2/3 clinical trial through 2020 and to commence a proof-of-concept study in additional hematologic myeloid malignancies in 2020. Accordingly, we will require substantial additional capital in order to further advance the imetelstat program, including conducting the research and development, clinical, regulatory and potential commercialization activities necessary to bring imetelstat to market. In this regard, our ability to complete the Phase 3 portion of IMerge and to commence, conduct and complete potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF or potential additional proof-of-concept studies in other hematologic myeloid malignancies, is dependent on our ability to raise substantial additional capital. In addition, our ability to commercialize imetelstat in the United States, if regulatory approval is granted, depends on us being able to establish sales and marketing capabilities. Because the outcome of any clinical activities and/or regulatory approval

process is highly uncertain, we cannot reasonably estimate whether any development activities we may undertake will succeed, and we may never recoup our investment in any imetelstat development, which would adversely affect our financial condition and our business and business prospects, and might cause us to cease operations. Our future capital requirements are difficult to forecast and will depend on many factors, including:

- the accuracy of the assumptions underlying our estimates for our capital needs;
- the progress, timing, magnitude, scope and costs of clinical development, manufacturing and potential commercialization of imetelstat, including the number of indications being pursued, subject to clearances and approvals by the FDA and other regulatory authorities;
- the scope, progress, duration, results and costs of current and potential future clinical trials, including the Phase 3 portion of IMerge, potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies, as well as non-clinical studies and assessments, of imetelstat;
- the costs, timing and outcomes of regulatory reviews or other regulatory actions related to imetelstat, such as submitting Phase 3 trial design proposals in MF and conducting further discussions with the FDA regarding a potential regulatory approval path in MF, as well as obtaining regulatory clearances and approvals in the United States and in other countries;
- the costs of preparing, filing and prosecuting patent applications and maintaining, enforcing and defending intellectual property-related claims;
- the costs of manufacturing imetelstat, including our ability to achieve any meaningful reduction in manufacturing costs;
- the costs of multiple third-party vendors and service providers, including our CROs and CMOs, to pursue the development, manufacturing and potential commercialization of imetelstat;
- our ability to establish, enforce and maintain collaborative or other strategic arrangements for research, development, clinical testing and manufacturing of imetelstat and potential future commercialization and marketing;
- our ability to successfully market and sell imetelstat, if imetelstat receives future regulatory approval or clearance, in the United States and other countries;
- our need to successfully recruit and retain additional key personnel to support the development and potential future commercialization of imetelstat;
- the costs and timing necessary to build a U.S. sales force to market and sell imetelstat, should it receive regulatory clearance;
- the sales price for imetelstat;
- the availability of coverage and adequate third-party reimbursement for imetelstat;
- expenses associated with the pending putative securities class action lawsuits and potential additional related lawsuits, as well as any other litigation;
- the extent and scope of our general and administrative expenses, including expenses associated with pending and potential future litigation; and
- the costs of maintaining and operating facilities in California and New Jersey, including higher expenses for travel, telecommunications and administrative oversight.

As a result of the termination of the Collaboration Agreement effective September 28, 2018, we are responsible for funding all clinical development, manufacturing, intellectual property maintenance and potential commercial activities for the imetelstat program. In order to further advance the imetelstat program, including completing the Phase 3 portion of IMerge and commencing, conducting and completing potential future clinical trials in other indications, such as potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies, we will need to raise substantial additional capital or establish additional collaborative arrangements with third-party collaborative partners, which may not be possible. In addition, as a

result of the termination of the Collaboration Agreement, we will not receive any milestone payments or royalties from Janssen for the development or sale of imetelstat, including any clinical development milestones. If we are unable to raise additional capital or establish alternative collaborative arrangements with third-party collaborative partners for imetelstat, the development of imetelstat may be further delayed, altered or abandoned, which might cause us to cease operations. Additional financing through public or private equity financings, including pursuant to our 2018 Sales Agreement with B. Riley FBR, capital lease transactions or other financing sources may not be available on acceptable terms, or at all. We may raise equity capital at a stock price or on other terms that could result in substantial dilution of ownership for our stockholders. The receptivity of the public and private equity markets to proposed financings is substantially affected by the general economic, market and political climate and by other factors which are unpredictable and over which we have no control. In this regard, volatility and instability in the global financial markets and political climate could adversely affect our ability to raise additional funds through financings and the terms upon which we may raise those funds.

In addition, we may seek additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our stockholders may be diluted, and the terms may include liquidation or other preferences that materially and adversely affect the rights of our stockholders. Debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through alliance, collaborative or licensing arrangements with third parties, we may have to relinquish valuable rights to imetelstat or our technologies or grant licenses on terms that are not favorable to us.

We cannot assure you that our existing capital resources, future interest income, and potential future sales of our common stock, including under our 2018 Sales Agreement with B. Riley FBR, will be sufficient to fund our operating plans. In any event, we will need substantial additional funds to meet operational needs and capital requirements to advance the imetelstat program in clinical development and potential commercialization, and our need for additional funds may arise sooner than planned. If adequate funds are not available on a timely basis, if at all, we may be unable to pursue further development, including completing the Phase 3 portion of IMerge, and commencing, conducting and completing potential Phase 3 clinical trials in MF, or potential proof-of-concept studies in other hematologic myeloid malignancies, or to pursue potential commercialization of imetelstat, which would severely harm our business and we might cease operations.

We currently have no source of product revenue and may never become consistently profitable.

Although we were profitable in 2015 due to the recognition of revenue in connection with the upfront payment from Janssen under the Collaboration Agreement, we have otherwise never been profitable and have incurred operating losses every year since our operations began in 1990. We will not receive any future milestone-based or royalty payments from Janssen relating to imetelstat, nor will Janssen share the cost of ongoing or future clinical trials of imetelstat or the costs for patents that were licensed to them under the terminated Collaboration Agreement, after September 28, 2018. We expect to continue to incur significant additional operating losses and our operating losses are likely to substantially increase given our sole financial responsibility for imetelstat clinical development activities. As of December 31, 2019, our accumulated deficit was approximately $1.1 billion. Losses have resulted principally from costs incurred in connection with our research and development activities and from general and administrative costs associated with our operations.

Substantially all of our revenues to date have been payments under collaboration agreements and milestones, royalties and other revenues from our licensing arrangements. With the termination of the Collaboration Agreement effective September 28, 2018, we have no ongoing collaboration agreements related to imetelstat. The patents underlying our license agreements related to our human telomerase reverse transcriptase, or hTERT, technology have expired. Any final revenues generated from our remaining licensing agreements related to our hTERT technology are expected to be minimal, and will be insufficient to sustain our operations. We have no current plans to enter into any new corporate collaboration, partnership or license agreements that result in revenues.

We also expect to experience increased negative cash flow for the foreseeable future as we fund our operations and imetelstat clinical development activities advance. This will result in decreases in our working

capital, total assets and stockholders' equity. Further, we may be unable to replenish our working capital by future financings. We will need to generate significant revenues to achieve consistent future profitability. We may never achieve consistent future profitability. Even if we do become profitable in the future, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to achieve consistent future profitability could negatively impact the market price of our common stock and our ability to sustain operations.

The 2017 comprehensive tax reform bill and possible future changes in tax laws or regulations could adversely affect our business and financial condition.

On December 22, 2017, President Trump signed into law tax legislation, which we refer to as the Tax Act, which significantly revised the Internal Revenue Code of 1986, as amended, or the Code. Future guidance from the U.S. Internal Revenue Service and other tax authorities with respect to the Tax Act may affect us, and certain aspects of the Tax Act could be repealed or modified in future legislation. Changes in corporate tax rates, the realization of net deferred tax assets relating to our U.S. operations, the taxation of foreign earnings, and the deductibility of expenses under the Tax Act or future tax reform legislation could have a material impact on the value of our deferred tax assets, could result in significant one-time charges in the current or future taxable years, and could increase our future U.S. tax expense. The foregoing items, as well as any other future changes in tax laws, could have a material adverse effect on our business, cash flow, financial condition, or results of operations. In addition, it is uncertain if and to what extent various states will conform to the Tax Act or any newly enacted federal tax legislation.

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

Our net operating loss carryforwards attributable to tax years ending before 2018 could expire unused and be unavailable to offset future income tax liabilities. Under the Tax Act, federal net operating losses incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal net operating losses is limited. It is uncertain if and to what extent various states will conform to the federal tax law changes. In addition, under Section 382 of the Code, and corresponding provisions of state law, if a corporation undergoes an "ownership change," generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period, the corporation's ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes (such as research tax credits) to offset its post-change taxable income or taxes may be limited. Changes in our stock ownership, some of which are outside of our control, may have resulted or could in the future result in an ownership change. If a limitation were to apply, utilization of a portion of our domestic net operating loss and tax credit carryforwards could be limited in future periods. In addition, a portion of the carryforwards may expire before being available to reduce future income tax liabilities which could adversely impact our financial position.

RISKS RELATED TO MANUFACTURING IMETELSTAT

Failure by us to establish and/or maintain a manufacturing supply chain to appropriately and adequately supply imetelstat for future clinical and commercial uses, would result in a further delay in or cessation of clinical trials and a further delay in or our inability to obtain regulatory approvals of imetelstat, and our business and business prospects could be severely harmed, and we could cease operations.

Although we have received inventories of drug product, drug substance and raw materials from Janssen under the Supply Agreement that meet our specifications, some of this material will require further processing in order to be used in clinical trials, and/or may also require regulatory review and acceptance prior to use. Therefore, we continue to work to re-establish our own manufacturing supply chain in order to further process the Janssen purchased materials as well as to be able to manufacture and supply additional quantities of imetelstat that meet applicable regulatory standards for current and potential future clinical trials and potential commercial uses. The process of manufacturing imetelstat is complex and subject to several risks, including:

- the ability to scale-up and attain sufficient production yields with appropriate quality control and quality assurance;
- reliance on third-party contract manufacturing organizations, or CMOs, and suppliers;

- supply chain issues, including the timely availability and shelf life requirements of raw materials and other supplies;
- shortage of qualified personnel; and
- regulatory acceptance and compliance with regulatory requirements, which are less well-defined for oligonucleotide products than for small molecule drugs and vary in each country where imetelstat might be sold or used.

As a result of these and other risks, we may be unable to establish and/or maintain a manufacturing supply chain capable of providing imetelstat for the Phase 3 portion of IMerge and/or potential future clinical trials of imetelstat, and potential future commercial uses, which would delay or result in a cessation of the Phase 3 portion of IMerge or potential future clinical trials of imetelstat. Occurrence of any such events would further delay or preclude any applications for regulatory approval and therefore further delay or preclude our ability to earn revenue from the commercialization, if any, of imetelstat, which would severely and adversely affect our financial results, business and business prospects, and might cause us to cease operations.

If third parties that manufacture imetelstat fail to perform as needed, then the clinical and commercial supply of imetelstat will be limited, and we may be unable to conduct or complete current or potential future clinical trials of imetelstat or to commercialize imetelstat in the future.

Our planned imetelstat manufacturing supply chain is expected to rely solely upon third-party contractors to perform certain process development or other technical and scientific work with respect to imetelstat, as well as to supply starting materials and manufacture drug substance and drug product. While we are currently in the process of establishing arrangements with third parties for the manufacture of imetelstat, our failure to establish such arrangements in a timely manner, or at all, could further delay, perhaps substantially, or preclude our ability to pursue imetelstat development on our own, increase our costs and otherwise negatively affect our financial results, business and business prospects. We may not be able to obtain third-party manufacturers for imetelstat on acceptable terms, or at all. We expect to rely on third-party contractors to produce and deliver sufficient quantities of imetelstat and other materials to support clinical trials on a timely basis and to comply with applicable regulatory requirements. We will not have direct control over these third-party personnel or operations. Reliance on these third-party manufacturers is subject to numerous risks, including:

- being unable to identify suitable third-party manufacturers, because the number of potential manufacturers is limited;
- regulatory authorities may require significant activities to validate and qualify any replacement manufacturer, which could involve new testing and compliance inspections;
- being unable to execute timely contracts with third-party manufacturers on acceptable terms, or at all;
- the inability of third-party manufacturers to timely formulate and manufacture imetelstat or to produce imetelstat in the quantities or of the quality required to meet clinical and commercial needs;
- decisions by third-party manufacturers to exit the contract manufacturing business during the time required to supply clinical trials or to successfully produce, store and distribute products;
- compliance by third-party manufacturers with current Good Manufacturing Practice, or cGMP, standards mandated by the FDA and state agencies and other government regulations corresponding to foreign regulatory authorities;
- breach or termination of manufacturing contracts;
- inadequate storage or maintenance at contracted facilities resulting in theft or spoilage;
- capacity limitation and scheduling imetelstat manufacturing activities as a priority in contracted facilities; and
- natural disasters that affect contracted facilities.

Each of these risks could lead to delays or shortages in drug supply, or the inability to manufacture drug supply necessary for non-clinical and clinical activities, and commercialization. For example, manufacturing delays could adversely impact the conduct or completion of the Phase 3 portion of IMerge or commencement of potential future clinical trials or preclude or delay potential future commercial sales, which could severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

In addition, third-party contractors and/or any other contractors may need to make substantial investments to enable sufficient capacity increases and cost reductions, and to implement those regulatory and compliance standards necessary for successful Phase 3 clinical trials and commercial production of imetelstat. These third-party contractors may not be willing or able to achieve such capacity increases, cost reductions, or regulatory and compliance standards, and even if they do, such achievements may not be at commercially reasonable costs. Changing manufacturers may be prolonged and difficult due to inherent technical complexities and because the number of potential manufacturers is limited. It may be difficult or impossible for us to find a replacement manufacturer on acceptable terms, or at all.

It may not be possible to manufacture imetelstat at costs or scales necessary to conduct clinical trials or potential future commercialization activities.

Oligonucleotides are relatively large molecules produced using complex chemistry, and the cost of manufacturing an oligonucleotide like imetelstat is greater than the cost of making typical small molecule drugs. Therefore, imetelstat for clinical use is more expensive to manufacture than most other treatments currently available today or that may be available in the future. Similarly, the cost of manufacturing imetelstat for commercial use will need to be significantly lower than current costs in order for imetelstat to become a commercially successful product. We may not be able to achieve sufficient scale increases or cost reductions necessary for successful commercial production of imetelstat. Failure to achieve necessary cost reductions could result in decreased sales, if any, for us, which would materially and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

RISKS RELATED TO MANAGING OUR GROWTH AND OTHER BUSINESS OPERATIONS

We may be unable to successfully retain or recruit key personnel to support the development and potential future commercialization of imetelstat or to otherwise successfully manage our growth.

Our ability to successfully develop imetelstat in the future and to potentially commercialize imetelstat depends to a significant extent on the skills, experience and efforts of our executive officers and key members of our staff. In addition, we will need to maintain and continue to hire experienced personnel in clinical science, biostatistics, clinical operations, pharmacovigilance, quality, manufacturing, regulatory affairs, medical affairs and sales and marketing, to enable us to further develop and potentially commercialize imetelstat.

We face intense competition for qualified individuals from numerous pharmaceutical, biopharmaceutical and biotechnology companies, as well as academic and other research institutions, and competition in our geographic regions is particularly intense. The substantial risks and uncertainties related to our development and potential commercialization of imetelstat, as well as the previous restructurings we implemented and the risks and uncertainties regarding our future business viability, could have an adverse impact on our ability to retain and recruit qualified personnel or we may incur unanticipated inefficiencies caused by our reduced personnel resources. We may also face higher than expected personnel costs in order to attract new management or development personnel, or to maintain our current executive officers and staff. If we are unable to successfully retain, motivate and incentivize our existing personnel, or to attract, assimilate and retain other highly qualified management and senior development personnel in the future on acceptable terms, our ability to further develop imetelstat will be impaired, and our business and the price of our common stock would be adversely impacted.

As our operations continue to expand, we expect that we will need to manage new and additional relationships with various service providers, vendors, suppliers and other third parties, as well as additional and expanded office locations, for example, our recently leased office in northern New Jersey and the planned relocation of our corporate headquarters in California. Our ability to timely occupy and relocate to our new corporate headquarters in California

depends on the performance by our lessor, as well as contractors and other third parties, of their contractual obligations. Such continued growth and expansion will require members of our management to assume significant added responsibilities. Our performance in managing any such future growth, if ineffective, could negatively impact our business prospects. We may not successfully manage our imetelstat development efforts effectively, including our current and potential future imetelstat clinical trials. If we fail to achieve key development goals, our abilities to grow as a company, and to further develop and potentially commercialize imetelstat, could be prevented or hindered, and our business and business prospects would be severely harmed, which might cause us to cease operations.

We expect imetelstat to remain our sole product candidate for the foreseeable future. If we are unable to successfully develop or commercialize imetelstat, our business and business prospects would be severely harmed, which might cause us to cease operations.

We plan to focus our efforts on the further development of imetelstat in hematologic myeloid malignancies. Accordingly, we do not currently have any plans to engage in any efforts to discover new product candidates. In addition, the outcome of our future efforts to seek to acquire and/or in-license other oncology products, product candidates, programs or companies in order to diversify our product candidate portfolio are highly uncertain and may be unsuccessful. As a result, we will be wholly reliant upon the development of imetelstat, our sole product candidate, for the foreseeable future. If we are unable to successfully develop and commercialize imetelstat, our business and business prospects would be severely harmed, which might cause us to cease operations.

If we are unable to establish potential future collaborative arrangements for imetelstat, we may have to delay, alter or abandon our imetelstat development and commercialization plans.

We intend to develop imetelstat broadly for hematologic myeloid malignancies, and to potentially commercialize, market and sell imetelstat in the United States. We plan to seek another collaborative partner or partners, at an appropriate time, to assist us in the potential development and commercialization of imetelstat outside the United States, and to provide funding for such activities. We face significant competition in seeking appropriate collaborative partners, and these potential collaborative arrangements are complex and time consuming to negotiate, document and implement. We may not be able to negotiate collaborative arrangements on acceptable terms, or at all. In this regard, collaborative arrangements with third parties may require us to relinquish material rights, including revenue from potential commercialization, on terms that are less attractive than under the Collaboration Agreement we had with Janssen, or to assume material ongoing development obligations that we would have to fund or otherwise support.

In any event, we are unable to predict when, if ever, we will enter into any collaborative arrangements because of the numerous risks and uncertainties associated with establishing collaborative arrangements. Moreover, as a result of the termination of the Collaboration Agreement and the significant risks and uncertainties regarding the future imetelstat development program, potential collaborative partners may be reluctant to enter into new collaborative arrangements with us, or may only be willing to do so on terms that are not favorable to us. As a result, we may not be successful in finding a new collaborative partner or partners on favorable terms, if at all. If we are unable to negotiate collaborative arrangements, we may have to:

- curtail the development of imetelstat,
- further delay, alter or abandon the imetelstat development program,
- further delay or abandon its potential commercialization,
- reduce the scope of potential future sales or marketing activities, or
- increase our expenditures and undertake development or commercialization activities at our own expense, which will require substantial additional capital than our current resources.

In order to advance the imetelstat program, including completing the Phase 3 portion of IMerge and commencing, conducting and completing potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies, as well as undertaking potential commercialization activities for imetelstat in the United States, we will need to raise substantial additional capital. In addition, if we elect to increase our expenditures to fund imetelstat development or commercialization activities outside the United States, we will be required to substantially increase our personnel resources and we will need to obtain substantial further capital, which may not be available to us on acceptable terms, or at all. If we are unable to raise substantial additional capital, we will not be able to advance the imetelstat program, including completing the Phase 3 portion of IMerge and commencing, conducting and completing potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies, nor will we be able to bring imetelstat to market and generate product revenues. Establishing the infrastructure necessary to further develop, commercialize, market and sell imetelstat worldwide will require substantial resources and may divert the attention of our management and key personnel and negatively impact our imetelstat development or commercialization efforts in the United States.

We currently have no products approved for commercial sale and we have not yet demonstrated an ability to obtain marketing approvals for any product candidates, which makes it difficult to assess our future viability.

We have never derived any revenue from the sales of any products. Our operations to date have been limited to organizing and staffing our company, acquiring, developing and securing our technology, undertaking non-clinical studies and clinical trials of imetelstat and past product candidates that we have subsequently discontinued, and engaging in research and development under collaboration agreements. We have not yet demonstrated an ability to obtain regulatory approvals for commercialization activities, formulate and manufacture commercial-scale products, or conduct sales and marketing activities necessary for successful product commercialization. Consequently, for these and other reasons discussed elsewhere in these risk factors, it is difficult to predict our future success and the viability of our business and the imetelstat program.

We may not be able to obtain or maintain sufficient insurance on commercially reasonable terms or with adequate coverage against potential liabilities in order to protect ourselves against product liability claims or claims related to clinical trial conduct.

Our business exposes us to potential product liability and other risks that are inherent in the testing, manufacturing and marketing of human therapeutic and diagnostic products. We may become subject to product liability claims or claims related to clinical trial conduct if the use of imetelstat is alleged to have injured patients, including any injuries alleged to arise from any hepatotoxicity or hemorrhagic event associated with the use of imetelstat. We currently have limited clinical trial liability insurance, and we may not be able to maintain this type of insurance for any clinical trials, including the Phase 3 portion of IMerge, or this type of insurance may become too expensive for us to afford because of the highly risky and uncertain nature of clinical trials generally and the high cost of insurance for our business activities. In addition, business liability and product liability insurance are becoming increasingly expensive, particularly for biotechnology and pharmaceutical companies, and the pool of insurers offering insurance coverage to biotechnology and pharmaceutical companies generally is becoming smaller, making it more difficult to obtain insurance for our business activities at a reasonable price, or at all. Being unable to obtain or maintain product liability, clinical trial liability, or other insurance for our business activities in the future on acceptable terms or with adequate coverage against potential liabilities would have a material adverse effect on our business, and could cause us to cease our development of imetelstat.

We and certain of our officers have been named as defendants in putative securities class action lawsuits. These lawsuits, and potential similar or related lawsuits, could result in substantial damages, divert management's time and attention from our business, and have a material adverse effect on our results of operations. These lawsuits, and any other lawsuits to which we are subject, will be costly to defend or pursue and are uncertain in their outcome.

Securities-related class action lawsuits and/or derivative lawsuits have often been brought against companies, including biotechnology and biopharmaceutical companies, that experience volatility in the market price of their securities. This risk is especially relevant for us because we often experience significant stock price volatility in connection with our product development activities. On January 23 and February 14, 2020, putative securities class

action lawsuits were commenced in the United States District Court for the Northern District of California, naming as defendants us and one of our officers. On March 5, 2020, a third putative securities class action lawsuit was commenced in the United States District Court for the District of New Jersey, naming as defendants us and two of our officers. All three lawsuits allege violations of the Securities Exchange Act of 1934 in connection with allegedly false and misleading statements made by us related to IMbark during the period from March 19, 2018 to September 26, 2018. The plaintiffs allege, among other things, that we failed to disclose facts related to the alleged failure by IMbark to meet the two primary endpoints of the trial, spleen response rate and Total Symptom Score, and that our stock price dropped when such information was disclosed. The plaintiffs seek damages and interest, and an award of reasonable costs, including attorneys' fees.

It is possible that additional lawsuits will be filed, or allegations received from stockholders, with respect to these same or other matters and also naming us and/or our officers and directors as defendants. Such lawsuits and any other related lawsuits are subject to inherent uncertainties, and the actual defense and disposition costs will depend upon many unknown factors. The outcome of such lawsuits is necessarily uncertain. We could be forced to expend significant resources in the defense of the pending lawsuits and any additional lawsuits, and we may not prevail. In addition, we may incur substantial legal fees and costs in connection with such lawsuits. We currently are not able to estimate the possible cost to us from these matters, as the pending lawsuits are currently at an early stage, and we cannot be certain how long it may take to resolve the pending lawsuits or the possible amount of any damages that we may be required to pay. Monitoring, initiating and defending against legal actions is time-consuming for our management, is likely to be expensive and may detract from our ability to fully focus our internal resources on our business activities. We could be forced to expend significant resources in the settlement or defense of the pending lawsuits and any potential future lawsuits, and we may not prevail in such lawsuits. Additionally, we may not be successful in having any such lawsuits dismissed or settled within the limits of our insurance coverage.

We have not established any reserve for any potential liability relating to the pending lawsuits or any potential future lawsuits. It is possible that we could, in the future, incur judgments or enter into settlements of claims for monetary damages. A decision adverse to our interests in the pending lawsuits, or in similar or related litigation, could result in the payment of substantial damages, or possibly fines, and could have a material adverse effect on our business, our stock price, cash flow, results of operations and financial condition.

We may be subject to third-party litigation, and such litigation would be costly to defend or pursue and uncertain in its outcome.

Our business may bring us into conflict with our licensees, licensors, or others with whom we have contractual or other business relationships, or with our competitors or others whose interests differ from ours. We may experience employment-related disputes as we seek to expand our personnel resources. We may face litigation with Janssen arising from or related to the Collaboration Agreement and/or its termination. We may become involved in performance or other disputes with the CROs we have retained to support our imetelstat clinical development activities, or with other third parties such as service providers, vendors, manufacturers, suppliers or consultants, which could result in a further delay or cessation of current and potential future clinical trials and otherwise significantly further delay our ability to develop imetelstat. If we are unable to resolve those conflicts on terms that are satisfactory to all parties, we may become involved in litigation brought by or against us.

Lawsuits are subject to inherent uncertainties, and defense and disposition costs depend upon many unknown factors. Despite the availability of insurance, we may incur substantial legal fees and costs in connection with litigation. Lawsuits could result in judgments against us that require us to pay damages, enjoin us from certain activities, or otherwise negatively affect our legal or contractual rights, which could have a significant adverse effect on our business. In addition, the inherent uncertainty of such litigation could lead to increased volatility in our stock price and a decrease in the value of our stockholders' investment in our common stock.

Our business could be adversely affected by the effects of health epidemics, including the recent coronavirus, or COVID-19, outbreak, in regions where we or third parties on which we rely have significant manufacturing facilities, concentrations of clinical trial sites or other business operations. We have a significant number of clinical trial sites in countries that have been directly affected by COVID-19, and depend on countries affected by COVID-19 for manufacturing operations for various stages of our supply chain. In addition, if COVID-19 becomes a worldwide pandemic, it could materially affect our operations globally, including at our headquarters in the San Francisco Bay Area and at our clinical trial sites throughout the globe.

Our business could be adversely affected by health epidemics in regions where we have significant manufacturing facilities, concentrations of clinical trial sites or other business operations.

If the COVID-19 outbreak continues to spread, we may need to limit operations or implement limitations, including limiting business travel and mandating work from home practices. There is a risk that other countries or regions may be less effective at containing COVID-19, or it may be more difficult to contain if the outbreak reaches a larger population or broader geography, in which case the risks described herein could be elevated significantly.

In particular, some of our suppliers of certain materials used in the production of imetelstat are located in countries affected by COVID-19. In these countries, closures and other restrictions resulting from the COVID-19 outbreak in the region may disrupt our supply chain or limit our ability to obtain sufficient materials for the manufacture of imetelstat.

In addition, our clinical trials may be affected by the COVID-19 outbreak. Site initiation, patient enrollment and patient monitoring may be delayed due to prioritization of hospital resources toward the COVID-19 outbreak. If COVID-19 becomes a worldwide pandemic, it may delay enrollment and monitoring in the Phase 3 portion of IMerge, and some patients may not be able to comply with clinical trial protocols if quarantines impede patient movement or interrupt healthcare services, and we may be unable to obtain blood samples for testing.

The ultimate impact of the COVID-19 outbreak or a similar health epidemic is highly uncertain and subject to change. We do not yet know the full extent of potential delays or impacts on our business, our supply chain, our clinical trials, healthcare systems or the global economy as a whole. However, these effects could have a material impact on our operations, and we continue to monitor the COVID-19 situation closely.

Business interruptions by natural disasters and other events beyond our control could negatively impact our business.

Our business operations are subject to interruption by natural disasters and catastrophic events beyond our control, including, but not limited to, earthquakes, hurricanes, typhoons, tropical storms, floods, tsunamis, fires, droughts, tornadoes, public health issues and pandemics, severe changes in climate, war, terrorism, and geo-political unrest and uncertainties. Further, outbreaks of pandemic diseases, such as coronavirus, or the fear of such events, could provoke responses, including government-imposed travel restrictions. Any delays or interruptions caused by any such events could negatively affect our business.

RISKS RELATED TO PROTECTING OUR INTELLECTUAL PROPERTY

Our success and the success of our planned future development and commercialization of imetelstat will depend on our ability to protect our technologies and imetelstat through patents and other intellectual property rights.

Protection of our proprietary technology is critically important to our business. Our success will depend in part on our ability to obtain, maintain, enforce and extend our patents and maintain trade secrets, both in the United States and in other countries.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, and our patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in loss of exclusivity or in patent claims being narrowed, invalidated or held unenforceable, which could limit our ability to stop others from using or commercializing imetelstat or our technology and/or limit the duration of the patent protection for imetelstat and our technology. In the event that we are unsuccessful in obtaining, maintaining,

enforcing and extending our patents and other intellectual property rights or having our licensors maintain the intellectual property rights we have licensed, the value of imetelstat and/or our technologies will be adversely affected, and we may not be able to further develop or potentially commercialize imetelstat. Loss or impairment of our intellectual property related to imetelstat might further delay or halt ongoing or potential future clinical trials of imetelstat and any applications for regulatory approval, and therefore further delay or preclude any future development or commercialization of imetelstat by us. Further, if imetelstat is approved for commercial sale, such loss of intellectual property rights could impair our ability to exclude others from commercializing products similar or identical to imetelstat and therefore result in decreased sales for us. Occurrence of any of these events would materially and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

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

The U.S. Patent and Trademark Office, or the Patent Office, and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. In addition, periodic maintenance fees, renewal fees, annuity fees and various other government fees on patents and/or patent applications will have to be paid to the Patent Office and various government patent agencies outside the United States over the lifetime of our owned and licensed patents and/or patent applications and any patent rights we may own or license in the future. 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, nonpayment of fees and failure to properly legalize and submit formal documents. In many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. There are situations, however, 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. In such an event, potential competitors might be able to enter the market with imetelstat or similar products, and this circumstance could harm our business and business prospects and the future of imetelstat. In addition, if we are responsible for patent prosecution and maintenance of patent rights in-licensed to us, any of the foregoing could expose us to liability to the applicable patent owner.

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

Patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after its first effective filing date. Given the amount of time required for the development, testing and regulatory review of imetelstat, patents protecting imetelstat might expire before imetelstat is commercialized. As a result, our intellectual property may not provide us with sufficient rights to exclude others from commercializing products similar or identical to imetelstat.

Under the Hatch-Waxman Act, a patent may be eligible for future patent term restoration of up to five years under certain circumstances. Depending upon the timing, duration and specifics of any potential marketing approval of imetelstat, one or more of our owned or licensed U.S. patents may be eligible for patent term extension under the Hatch-Waxman Act. Similar extensions are also available in certain foreign countries and territories, such as in Japan and in Europe. If we fail to apply for applicable patent term extensions or adjustments, we will have a more limited time during which we can enforce our granted patent rights. In addition, should we seek such a patent term extension, we may not be granted any such patent term extension and/or the applicable time period of such patent term extension could be less than five years. Moreover, in some countries the scope of protection for claims under such patent term extensions, if any, does not extend to the full scope of the claims but is limited to the product composition as approved. If we do not have sufficient patent life to protect imetelstat, our financial results, business and business prospects, and the future of imetelstat would be materially and adversely affected, which might cause us to cease operations.

Changes in U.S. or foreign patent law or interpretations of such patent laws could diminish the value of our patents in general, thereby impairing our ability to protect our technologies and imetelstat.

The patent positions of pharmaceutical and biopharmaceutical companies, including ours, are highly uncertain and involve complex legal and technical questions. In particular, legal principles for biotechnology and pharmaceutical patents in the United States and in other countries are evolving, and the extent to which we will be able to obtain patent coverage to protect our technologies and imetelstat, or enforce or defend issued patents, is uncertain.

A number of significant changes to U.S. patent law occurred when the Leahy-Smith America Invents Act, or the AIA, was signed into law on September 16, 2011. These include provisions that affect the way patent applications are examined and may affect patent litigation. Many of the substantive changes to patent law associated with the AIA, and in particular, the first to file provisions, became effective on March 16, 2013. For example, the AIA limits where a patentee may file a patent infringement suit. The AIA and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents.

Since the publication of discoveries in scientific or patent literature tends to lag behind actual discoveries by at least several months and sometimes several years, the persons or entities that we name as inventors in our patents and patent applications may not have been the first to invent the inventions disclosed in the patent applications or patents, or the first to file patent applications for these inventions. As a result, we may not be able to obtain patents for discoveries that we otherwise would consider patentable and that we consider to be extremely significant to the future success of imetelstat. Thus, our ability to protect our patentable intellectual property depends, in part, on our ability to be the first to file patent applications with respect to our inventions or inventions that were developed by Janssen under the Collaboration Agreement and to which we have an exclusive license for the future development, commercialization and manufacture of imetelstat. Delay in the filing of a patent application for any purpose, including further development or refinement of an invention, may result in the risk of loss of patent rights.

U.S. court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. On March 20, 2012, in *Mayo Collaborative Services, DBA Mayo Medical Laboratories, et al. v. Prometheus Laboratories, Inc.*, the Court held that several claims drawn to measuring drug metabolite levels from patient samples and correlating them to drug doses were not patentable subject matter. In addition, court rulings in cases such as *BRCA1- & BRCA2-Based Hereditary Cancer Test Patent Litig*. and *Promega Corp. v. Life Technologies Corp.* have also narrowed the scope of patent protection available in certain circumstances. In addition to increasing uncertainty with regard to our ability to obtain certain patent claims in the future, this combination of events may have created uncertainty with respect to the value of certain patents we have previously obtained or in-licensed.

Following the result of a referendum in 2016, the United Kingdom left the European Union on January 31, 2020, commonly referred to as Brexit. Pursuant to the formal withdrawal arrangements agreed between the United Kingdom and the European Union, the United Kingdom will be subject to a transition period until December 31, 2020, during which EU rules will continue to apply. Negotiations between the United Kingdom and the European Union are expected to continue in relation to the customs and trading relationship between the United Kingdom and the European Union after December 31, 2020. The impact of the withdrawal of the United Kingdom from the European Union will not be known for some time, which could lead to a period of considerable uncertainty relating to our ability to obtain and maintain Supplementary Protection Certificates of imetelstat based on our United Kingdom patents and our ability to establish and maintain European trademarks in the United Kingdom.

In 2012, the European Union Patent Package, or EU Patent Package, regulations were passed with the goal of providing for a single pan-European Unity Patent, or UP, and a new European Unified Patent Court, or UPC, for litigation of European patents. Once established, the UPC would have jurisdiction over traditional European patents and new UPs in the United Kingdom and all Contracting Member States of the European Union. However, political activity in the United Kingdom and a legal challenge in Germany has delayed ratification of the EU Patent Package in these countries. There have been many delays in the implementation of the EU Patent Package, and further delays may occur. When the EU Patent Package is ratified and in effect, all European patents, including those issued prior to ratification, would by default automatically fall under the jurisdiction of the UPC and allow for the possibility of

obtaining pan-European injunctions. Under the EU Patent Package as currently proposed, once the UPC is established, patent holders are permitted to "opt out" of the UPC on a patent-by-patent basis, although the time permitted for this opt-out is not yet known. Owners of traditional European patent applications who receive notice of grant after the EU Patent Package is ratified could validate the patent nationally, and file an opt-out demand. The EU Patent Package may increase the uncertainties and costs surrounding the enforcement or defense of our issued European patents. The full impact on future European patent filing strategy and the enforcement or defense of our issued European patents in member states and/or the UPC is not known.

Depending on decisions by the U.S. federal courts, the Patent Office and similar authorities in foreign jurisdictions, the interpretation of 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. Occurrence of these events and/or significant impairment of our imetelstat patent rights would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, which might cause us to cease operations.

Challenges to our owned or licensed patent rights would result in costly and time-consuming legal proceedings that could prevent or limit development of imetelstat.

Our patents or those patent rights we have licensed, including patent rights that we may seek with respect to inventions made by past or future collaborators, may be challenged through administrative or judicial proceedings, which could result in the loss of important patent rights. For example, where more than one party seeks U.S. patent protection for the same technology in patent applications that are subject to the law before the implementation of the AIA, the Patent Office may declare an interference proceeding in order to ascertain the party to which the patent should be issued. Patent interferences are typically complex, highly contested legal proceedings, subject to appeal. They are usually expensive and prolonged, and can cause significant delay in the issuance of patents. Our pending patent applications or our issued patents, or those we have licensed and may license from others, may be drawn into interference proceedings or be challenged through post-grant review procedures or litigation, any of which could delay or prevent the issuance of patents, or result in the loss of issued patent rights. We may not be able to obtain from our past or future collaborators the information needed to support our patent rights which could result in the loss of important patent rights.

Under the AIA, interference proceedings between patent applications filed on or after March 16, 2013 have been replaced with other types of proceedings, including derivation proceedings. The AIA also includes post-grant review procedures subjecting U.S. patents to post-grant review procedures similar to European oppositions, such as *inter partes* review, or IPR, covered business method post-grant reviews and other post-grant reviews. This applies to all of our U.S. patents and those we have licensed and may license from others, even those issued before March 16, 2013. Because of a lower evidentiary standard necessary to invalidate a patent claim in Patent Office proceedings compared to the evidentiary standard in U.S. federal court, a third-party could potentially provide evidence in a Patent Office proceeding sufficient for the Patent Office to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third-party could attempt to use the Patent Office procedures to invalidate patent claims that would not have been invalidated if first challenged by the third-party as a defendant in a district court action. U.S. patents owned or licensed by us may therefore be subject to post-grant review procedures, as well as other forms of review and re-examination. In addition, the IPR process under the AIA permits any person, whether they are accused of infringing the patent at issue or not, to challenge the validity of certain patents. As a result, entities associated with hedge funds have challenged valuable pharmaceutical patents through the IPR process. Significant impairment of our imetelstat patent rights would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, which might cause us to cease operations.

Certain jurisdictions, such as Europe, New Zealand and Australia, permit oppositions to be filed against granted patents or patents proposed to be granted. Because we seek to enable potential global commercialization of imetelstat, securing both proprietary protection and freedom to operate outside of the United States is important to our business. Opposition proceedings require significant time and costs, and if we are unsuccessful or are unable to commit these types of resources to protect our imetelstat patent rights, we could lose our patent rights and we could be prevented or limited in the development and commercialization of imetelstat.

As more groups become engaged in scientific research and product development in the areas of telomerase biology and hematologic malignancies, the risk of our patents, or patents that we have in-licensed, being challenged through patent interferences, derivation proceedings, IPRs, post-grant proceedings, oppositions, re-examinations, litigation or other means will likely increase. For example, litigation may arise as a result of our decision to enforce our patent rights against third parties. Challenges to our patents through these procedures would be extremely expensive and time-consuming, even if the outcome was favorable to us. An adverse outcome in a patent dispute could severely harm our ability to further develop or commercialize imetelstat, or could otherwise have a material adverse effect on our business, and might cause us to cease operations, by:

- causing us to lose patent rights in the relevant jurisdiction(s);
- subjecting us to litigation, or otherwise preventing us from commercializing imetelstat in the relevant jurisdiction(s);
- requiring us to obtain licenses to the disputed patents;
- forcing us to cease using the disputed technology; or
- requiring us to develop or obtain alternative technologies.

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

Filing, prosecuting, maintaining, defending and enforcing patents on imetelstat and our technologies in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States are less extensive than those in the United States. The requirements for patentability may differ in certain countries, particularly in developing countries; thus, even in countries where we do pursue patent protection, there can be no assurance that any patents will issue with claims that cover imetelstat and our technologies. There can be no assurance that we will obtain or maintain patent rights in or outside the United States under any future license agreements. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, even in jurisdictions where we pursue patent protection, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not pursued and obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with imetelstat and our technologies and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets and other intellectual property protection, particularly those relating to biotechnology and pharmaceutical products, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. For example, many foreign countries have compulsory licensing laws under which a patent owner must grant licenses to third parties. Proceedings to enforce our patent rights, even if obtained, 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. While we intend to protect our intellectual property rights in major markets for imetelstat, we cannot ensure that we will be able to initiate or maintain similar efforts in all jurisdictions in which we may wish to market imetelstat. 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.

We may be subject to infringement claims that are costly to defend, and such claims may limit our ability to use disputed technologies and prevent us from pursuing research, development, manufacturing or commercialization of imetelstat.

The commercial success of imetelstat will depend upon our ability to research, develop, manufacture, market and sell imetelstat without infringing or otherwise violating the intellectual property and other proprietary rights of third parties. There is considerable intellectual property litigation in the biotechnology and pharmaceutical industries, and many pharmaceutical companies, including potential competitors, have substantial patent portfolios. In the event our technologies infringe the rights of others or require the use of discoveries and technologies controlled by third parties, we may be prevented from pursuing research, development, manufacturing or commercialization of imetelstat, or may be required to obtain licenses to those patents or other proprietary rights or develop or obtain alternative technologies. For example, we are aware that certain third parties have or may be prosecuting patents and patent estates that may relate to imetelstat, and while we believe these patents will expire before imetelstat is able to be commercialized and/or that these patents are invalid and/or would not be infringed by the manufacture, use or sale of imetelstat, it is possible that the owner(s) of these patents will assert claims against us in the future. If that were to occur, we might need to obtain unblocking licenses from such third parties, develop alternative non-infringing technologies, which we may not be able to do at an acceptable cost or on acceptable terms, or at all, or cease the development of imetelstat. In addition, while our past collaboration agreements have terminated, we are still subject to indemnification obligations to our collaborators, including with respect to claims of third-party patent infringement.

Since we cannot be aware of all intellectual property rights potentially relating to imetelstat and its uses, we do not know with certainty that imetelstat, or the intended commercialization thereof, does not and will not infringe or otherwise violate any third-party's intellectual property. Any infringement claims against us would likely be expensive to resolve, and the cost of any unblocking license that we could be required to obtain is unpredictable and could be significant. If we are unable to resolve an infringement claim successfully, we could be subject to an injunction that would prevent us from potentially commercializing imetelstat and could also require us to pay substantial damages. In addition to infringement claims, in the future we may also be subject to other claims relating to intellectual property, such as claims that we have misappropriated the trade secrets of third parties. Provided that we are successful in continuing the development of imetelstat, we expect to see more efforts by others to obtain patents that are positioned to cover imetelstat. Our success therefore depends significantly on our ability to operate without infringing patents and the proprietary rights of others.

We may become aware of discoveries and technologies controlled by third parties that are advantageous or necessary to further develop or manufacture imetelstat. Under such circumstances, we may initiate negotiations for licenses to other technologies as the need or opportunity arises. We may not be able to obtain a license to a technology required to pursue the research, development, manufacture or commercialization of imetelstat on commercially favorable terms, or at all, or such licenses may be terminated on certain grounds, including as a result of our failure to comply with the obligations under such licenses. If we do not obtain a necessary license or if such a license is terminated, we may need to redesign such technologies or obtain rights to alternative technologies, which may not be possible, and even if possible, could cause further delays in the development efforts for imetelstat and could increase the development and/or production costs of imetelstat. In cases where we are unable to license necessary technologies, we could be subject to litigation and prevented from pursuing research, development, manufacturing or commercialization of imetelstat, which would materially and adversely impact our business. Failure by us to obtain rights to alternative technologies or a license to any technology that may be required to pursue research, development, manufacturing or commercialization of imetelstat would further delay current and potential future clinical trials of imetelstat and any applications for regulatory approval, impair our ability to sell imetelstat, if approved, and therefore result in decreased sales of imetelstat for us. Occurrence of any of these events would materially and adversely affect our business, and might cause us to cease operations.

We may become involved in disputes with past or future collaborator(s) over intellectual property inventorship, ownership or use, and publications by us, or by investigators, scientific consultants, research collaborators or others. Such disputes could impair our ability to obtain patent protection or protect our proprietary information, which, in either case, could have a significant impact on our business.

Inventions discovered under research, material transfer or other collaboration agreements may become jointly owned by us and the other party to such agreements in some cases, and may be the exclusive property of either party in other cases. Under some circumstances, it may be difficult to determine who invents and owns a particular invention, or whether it is jointly owned, and disputes can arise regarding inventorship, ownership and use of those inventions. These disputes could be costly and time-consuming, and an unfavorable outcome could have a significant adverse effect on our business if we were not able to protect our license rights to these inventions. In addition, clinical trial investigators, scientific consultants and research collaborators generally have contractual rights to publish data and other proprietary information, subject to review by the trial sponsor. Publications by us, or by investigators, scientific consultants, previous employees, research collaborators or others, either with permission or in contravention of the terms of their agreements with us or without past or future collaborators, may impair our ability to obtain patent protection or protect proprietary information which would have a material adverse effect on our business, and might cause us to cease operations.

Much of the information and know-how that is critical to our business is not patentable, and we may not be able to prevent others from obtaining this information and establishing competitive enterprises.

We sometimes rely on trade secrets to protect our proprietary technology, especially in circumstances in which we believe patent protection is not appropriate or available. We attempt to protect our proprietary technology in part by confidentiality agreements with our employees, consultants, collaborators and contractors. We cannot provide assurance that these agreements will not be breached, that we would have adequate remedies for any breach, or that our trade secrets will not otherwise become known or be independently discovered by competitors, any of which would harm our business significantly.

In May 2016, the Defend Trade Secrets Act of 2016, or the DTSA, was enacted, providing a federal cause of action for misappropriation of trade secrets. Under the DTSA, an employer may not collect enhanced damages or attorney fees from an employee or contractor in a trade secret dispute brought under the DTSA, unless certain advanced provisions are observed. We cannot provide assurance that our existing agreements with employees and contractors contain notice provisions that would enable us to seek enhanced damages or attorneys' fees in the event of any dispute for misappropriation of trade secrets brought under the DTSA.

Significant disruptions of information technology systems, including cloud-based systems, or breaches of data security could adversely affect our business.

Our business is increasingly dependent on critical, complex and interdependent information technology systems, including cloud-based systems, to support business processes as well as internal and external communications. Our computer and information technology systems, and those of our collaborators, service providers and contractors, are potentially vulnerable to breakdown, malicious intrusion, malware, computer viruses, natural disasters, terrorism, war, and telecommunication and electrical failures that may result in damage to or the impairment of key business processes, or the loss or corruption of confidential information, including intellectual property, proprietary business information and personal information. Such disruptions and breaches of security could have a material adverse effect on our business, financial condition and results of operations. The costs to us to mitigate network security problems, bugs, viruses, worms, malicious software programs and security vulnerabilities could be significant, and while we have implemented security measures to protect our data security and information technology systems, our efforts to address these problems may not be successful, and these problems could result in unexpected interruptions, delays, cessation of service and other harm to our business and our competitive position. In addition, we rely on our collaborators, service providers, including our CROs, and contractors to establish and maintain appropriate information technology systems and data security protections. However, except for contractual duties and obligations, we have limited ability to control their actions related to such matters. If such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our imetelstat development program. For example, the loss of clinical trials data from completed, ongoing or planned clinical trials

could result in delays in potential regulatory approval efforts and significantly increase our costs to recover or reproduce the data.

In addition, our computer and information technology systems, as well as those of our collaborators, service providers and contractors, are potentially vulnerable to data security breaches, whether by employees, contractors, consultants, malware, phishing attacks, or other cyber-attacks, that may expose confidential information, intellectual property, proprietary business information or personal information to unauthorized persons. If a data security breach affects our systems or those of third parties upon which we rely, corrupts our data or results in the unauthorized disclosure or release of personally identifiable information by our collaborators, service providers, contractors or us, our reputation could be materially damaged, and we could be subject to significant fines, increased costs or loss of revenue. In addition, such a breach may require notification to governmental agencies, supervisory bodies, credit reporting agencies, the media or individuals pursuant to various federal, state and foreign data protection, privacy and security laws, regulations and guidelines, if applicable. These may include state breach notification laws, and the EU General Data Protection Regulation (EU) 2016/679, or GDPR. Accordingly, a data security breach or privacy violation that leads to unauthorized access to, disclosure or modification of personal information (including protected health information), that prevents access to personal information or materially compromises the privacy, security, or confidentiality of the personal information, could result in fines, increased costs or loss of revenue as a result of:

- harm to our reputation;
- fines or penalties imposed on us by regulatory authorities;
- additional compliance obligations or enforcement measures under federal, state or foreign laws;
- remediation and corrective action we undertake as required by law or as otherwise necessary;
- litigation and potential civil or criminal liability; and
- requirements to verify the accuracy of affected data.

If we are unable to prevent such data security breaches or privacy violations or implement satisfactory remedial measures, our operations could be disrupted, and we may suffer loss of reputation, financial loss and other regulatory penalties because of lost or misappropriated information, including sensitive patient data. In addition, these breaches and other inappropriate access can be difficult to detect, and any delay in identifying them may lead to increased harm of the type described above. Moreover, the prevalent use of mobile devices that access confidential information increases the risk of data security breaches, which could lead to the loss of confidential information, trade secrets or other intellectual property. While we have implemented security measures to protect our computer and information technology systems, because the techniques used to obtain unauthorized access, disable or degrade service, or sabotage systems, change frequently, become more sophisticated, and often are not recognized until launched against a target, we or our collaborators, service providers or contractors may be unable to anticipate these techniques or to implement adequate preventative measures. In addition, failure to maintain effective internal accounting controls related to data security breaches and cybersecurity in general could impact our ability to produce timely and accurate financial statements and could subject us to regulatory scrutiny.

Changes in and failures to comply with U.S. and foreign privacy and data protection laws, regulations and standards may adversely affect our business, operations and financial performance.

We are subject to or affected by numerous federal, state and foreign laws and regulations, as well as regulatory guidance, governing the collection, use, disclosure, retention, and security of personal data, such as information that we collect about patients and healthcare providers in connection with clinical trials in the United States and abroad. Although we became Privacy Shield certified by the U.S. Department of Commerce's International Trade Administration in April 2019, there is a risk that our Privacy Shield certification could be revoked or held by a court of competent jurisdiction to be an invalid basis for the transfer of personal data outside of the European Economic Area. The global data protection landscape is rapidly evolving, and implementation standards and enforcement practices are likely to remain uncertain for the foreseeable future. This evolution may create uncertainty in our business, affect our or our collaborators', service providers' and contractors' ability to operate in certain jurisdictions or to collect, store, transfer use and share personal information, necessitate the

acceptance of more onerous obligations in our contracts, result in liability or impose additional costs on us. The cost of compliance with these laws, regulations and standards is high and is likely to increase in the future. Any failure or perceived failure by us or our collaborators, service providers and contractors to comply with federal, state or foreign laws or regulation, our internal policies and procedures or our contracts governing processing of personal information could result in negative publicity, diversion of management time and effort and proceedings against us by governmental entities or others. In many jurisdictions, enforcement actions and consequences for noncompliance are rising.

In the United States, California adopted the California Consumer Privacy Act, or CCPA, which became effective in January 2020. The CCPA establishes a privacy framework for covered businesses, including an expansive definition of personal information and data privacy rights for California residents. The CCPA includes a framework with potentially severe statutory damages and private rights of action. The CCPA requires covered companies to provide new disclosures to California consumers (as that word is broadly defined in the CCPA), provide such consumers new ways to opt-out of certain sales of personal information, and allow for a new cause of action for data breaches. It remains unclear how the CCPA will be interpreted, but as currently written, it may impact our business activities and exemplifies the vulnerability of our business to not only cyber threats but also the evolving regulatory environment related to personal data. As we expand our operations, the CCPA may increase our compliance costs and potential liability. Some observers have noted that the CCPA could mark the beginning of a trend toward more stringent privacy legislation in the United States. Other states are beginning to pass similar laws.

Compliance with these and any other applicable privacy and data security laws and regulations is a rigorous and time-intensive process, and we may be required to put in place additional mechanisms to ensure compliance with the new data protection rules. If we fail to comply with any such laws or regulations, we may face significant fines and penalties that could adversely affect our business, financial condition and results of operations. Furthermore, the laws are not consistent, and compliance in the event of a widespread data breach is costly.

Our operations abroad may also be subject to increased scrutiny or attention from data protection authorities. Many countries in these regions have established or are in the process of establishing privacy and data security legal frameworks with which we, our collaborators, service providers, including our CROs, and contractors must comply. For example, the EU has adopted the GDPR, which went into effect in May 2018 and introduces strict requirements for processing the personal information of EU subjects, including clinical trial data. The GDPR has and will continue to increase compliance burdens on us, including by mandating potentially burdensome documentation requirements and granting certain rights to individuals to control how we collect, use, disclose, retain and process information about them. The processing of sensitive personal data, such as physical health condition, may impose heightened compliance burdens under the GDPR and is a topic of active interest among foreign regulators. In addition, the GDPR provides for more robust regulatory enforcement and fines of up to €20 million or 4% of the annual global revenue of the noncompliant company, whichever is greater. As we expand into other foreign countries and jurisdictions, we may be subject to additional laws and regulations that may affect how we conduct business.

RISKS RELATED TO OUR COMMON STOCK AND FINANCIAL REPORTING

Historically, our stock price has been extremely volatile.

Historically, our stock price has been extremely volatile. Between January 1, 2010 and December 31, 2019, our stock has traded as high as $7.79 per share and as low as $0.91 per share. Between January 1, 2017 and December 31, 2019, the price has ranged between a high of $6.99 per share and a low of $0.95 per share. The significant market price fluctuations of our common stock have been due to and may in the future be influenced by a variety of factors, including:

- termination of the Collaboration Agreement by Janssen in September 2018;
- announcements regarding the research and development of imetelstat, or results of, further delays in, discontinuation of, or further modifications or refinements to any clinical trials of imetelstat, including the Phase 3 portion of IMerge, for any reason, or our inability, for any reason, to successfully continue the development of imetelstat;

- obtaining the substantial additional capital, on commercially reasonable terms, necessary to advance the development of imetelstat, including completing the Phase 3 portion of IMerge and commencing, conducting and completing potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies;
- preliminary, interim or final clinical trial data reported with respect to current or potential future clinical trials of imetelstat, and investor perceptions thereof;
- not receiving timely regulatory clearances or approvals in any jurisdiction, whether within or outside of the United States, including, if we do not obtain regulatory clearance to commence, modify, conduct or continue clinical trials of imetelstat in MF, MDS or any additional hematologic myeloid malignancies in a timely manner or at all;
- announcements regarding the safety of imetelstat and partial or full clinical holds placed on the imetelstat INDs by the FDA or other regulatory authorities, or other regulatory developments related to imetelstat;
- the experimental nature of imetelstat;
- the terms and timing of any future collaboration agreements for the development and potential commercialization of imetelstat in countries outside of the United States that we may establish;
- the demand in the market for our common stock;
- announcements of technological innovations, new commercial products, or clinical progress or lack thereof by us, potential future collaborative partners or our competitors;
- fluctuations in our operating results;
- increased or continuing operating losses as a result of our sole financial responsibility for the development and potential future commercialization of imetelstat or otherwise;
- general domestic and international market conditions or market conditions relating to the biopharmaceutical and pharmaceutical industries;
- announcements concerning imetelstat proprietary rights;
- comments by securities analysts or other third parties, including blogs, articles and other media;
- large stockholders exiting their position in our common stock or an increase in the short interest in our common stock;
- announcements of or developments concerning pending and potential future litigation;
- the issuance of common stock to partners, vendors or investors to raise additional capital; and
- the occurrence of any other risks and uncertainties discussed under the heading “Risk Factors.”

Stock prices and trading volumes for many biopharmaceutical companies fluctuate widely for a number of reasons, including factors which may be unrelated to their businesses or results of operations, such as media coverage, statements made on message boards and social media forums, legislative and regulatory measures and the activities of various interest groups or organizations. In addition to the risk factors described in this section, overall market volatility, as well as general domestic or international economic, market and political conditions, could materially and adversely affect the market price of our common stock and the return on your investment.

In addition, as further discussed in the Risk Factor above entitled *“We and certain of our officers have been named as defendants in putative securities class action lawsuits. These lawsuits, and potential similar or related lawsuits, could result in substantial damages, divert management’s time and attention from our business, and have a material adverse effect on our results of operations. These lawsuits, and any other lawsuits to which we are subject, will be costly to defend or pursue and are uncertain in their outcome”,* we and two of our officers have been named as defendants in three putative class action lawsuits. Such lawsuits have often been instituted against companies, including us, whose securities have experienced periods of volatility in market price. The pending lawsuits and any lawsuits brought against us in the future could result in substantial costs, which would hurt our financial condition

and results of operations and divert management's attention and resources, which could result in delays of the Phase 3 portion of IMerge and/or could preclude or delay potential future clinical trials, such as potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies, or could preclude or delay commercialization efforts.

We may fail to continue to meet the listing standards of Nasdaq, and as a result our common stock may be delisted, which could have a material adverse effect on the liquidity of our common stock.

Our common stock is currently traded on the Nasdaq Global Select Market. The Nasdaq Stock Market LLC has requirements that a company must meet in order to remain listed on Nasdaq. In particular, Nasdaq rules require us to maintain a minimum closing bid price of $1.00 per share of our common stock. The closing bid price of our common stock has fluctuated below $1.00 per share in 2018, and while the price has fluctuated above $1.00 per share as well in that time period, in 2020 the closing bid price has been below $1.00 per share. If the closing bid price of our common stock were to remain below $1.00 per share for 30 consecutive trading days, or we do not meet other listing requirements, we would fail to be in compliance with Nasdaq's listing standards. There can be no assurance that we will continue to meet the minimum bid price requirement, or any other requirement in the future. If we fail to meet the minimum bid price requirement, The Nasdaq Stock Market LLC may initiate the delisting process with a notification letter. If we were to receive such a notification, we would be afforded a grace period of 180 calendar days to regain compliance with the minimum bid price requirement. In order to regain compliance, shares of our common stock would need to maintain a minimum closing bid price of at least $1.00 per share for a minimum of 10 consecutive trading days. In addition, we may be unable to meet other applicable Nasdaq listing requirements, including maintaining minimum levels of stockholders' equity or market values of our common stock, in which case our common stock could be delisted. If our common stock were to be delisted, the liquidity of our common stock would be adversely affected, and the market price of our common stock could decrease.

The sale of a substantial number of shares may adversely affect the market price of our common stock.

As of December 31, 2019, we had 450,000,000 shares of common stock authorized for issuance and 199,814,581 shares of common stock outstanding. In addition, we had reserved 45,395,620 shares of our common stock for future issuance pursuant to our option and equity incentive plans and outstanding warrant as of December 31, 2019. In addition, under the universal shelf registration statement filed by us in May 2018 and declared effective by the SEC in July 2018, we may sell any combination of common stock, preferred stock, debt securities and warrants in one or more offerings, up to a cumulative value of $250 million.

Future sales of our common stock or the perception that such sales could occur, or the issuance of common stock to fund our operations and imetelstat development, including pursuant to our 2018 Sales Agreement with B. Riley FBR, could cause immediate dilution and adversely affect the market price of our common stock. The sale or issuance of our securities, as well as the existence of outstanding options and shares of common stock reserved for issuance under our option and equity incentive plans and outstanding warrant, also may adversely affect the terms upon which we are able to obtain additional capital through the sale of equity securities, which could negatively affect the market price of our common stock and the return on your investment.

Our undesignated preferred stock may inhibit potential acquisition bids; this may adversely affect the market price of our common stock and the voting rights of holders of our common stock.

Our certificate of incorporation provides our board of directors with the authority to issue up to 3,000,000 shares of undesignated preferred stock and to determine or alter the rights, preferences, privileges and restrictions granted to or imported upon these shares without further vote or action by our stockholders. The issuance of shares of preferred stock may delay or prevent a change in control transaction without further action by our stockholders. As a result, the market price of our common stock may be adversely affected.

In addition, if in the future, we issue preferred stock that has preference over our common stock with respect to the payment of dividends or upon our liquidation, dissolution or winding up, or if we issue preferred stock with voting rights that dilute the voting power of our common stock, the rights of holders of our common stock or the market price of our common stock could be adversely affected.

Provisions in our charter, bylaws and Delaware law may inhibit potential acquisition bids for us, which may prevent holders of our common stock from benefiting from what they believe may be the positive aspects of acquisitions and takeovers.

Provisions of our charter documents and bylaws may make it substantially more difficult for a third-party to acquire control of us and may prevent changes in our management, including provisions that:

- prevent stockholders from taking actions by written consent;
- divide the board of directors into separate classes with terms of office that are structured to prevent all of the directors from being elected in any one year; and
- set forth procedures for nominating directors and submitting proposals for consideration at stockholders' meetings.

Provisions of Delaware law may also inhibit potential acquisition bids for us or prevent us from engaging in business combinations. In addition, we have individual severance agreements with our executive officers and a company-wide severance plan, either of which could require a potential acquirer to pay a higher price. Either collectively or individually, these provisions may prevent holders of our common stock from benefiting from what they may believe are the positive aspects of acquisitions and takeovers, including the potential realization of a higher rate of return on their investment from these types of transactions.

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

Our amended and restated bylaws provide that, unless we consent to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for:

- any derivative action or proceeding brought on our behalf,
- any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or to our stockholders;
- any action asserting a claim arising pursuant to any provision of the General Corporation Law of the State of Delaware, our certificate of incorporation, or our bylaws, or
- any action asserting a claim governed by the internal affairs doctrine.

While the exclusive forum provisions in our bylaws do not apply to lawsuits brought to enforce a duty or liability created by the Exchange Act or the Securities Act of 1933, as amended, or any claim for which the federal courts have exclusive jurisdiction, these provisions may nonetheless limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our current or former directors, officers, or other employees, which may discourage such lawsuits against us and our current or former directors, officers, and other employees. Alternatively, if a court were to find the exclusive forum provisions contained in our bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could have a material and adverse impact on our business and our financial condition.

We do not intend to pay cash dividends on our common stock in the foreseeable future.

We do not anticipate paying cash dividends on our common stock in the foreseeable future. Any payment of cash dividends will depend upon our financial condition, results of operations, capital requirements and other factors and will be at the discretion of our board of directors.

Failure to achieve and maintain effective internal controls in accordance with Section 404 of the Sarbanes-Oxley Act of 2002 could have a material adverse effect on our business and stock price.

Section 404 of the Sarbanes-Oxley Act of 2002, or Section 404, requires that we establish and maintain an adequate internal control structure and procedures for financial reporting. Our annual reports on Form 10-K must contain an annual assessment by management of the effectiveness of our internal control over financial reporting and must include disclosure of any material weaknesses in internal control over financial reporting that we have identified. In addition, our independent registered public accounting firm must provide an opinion annually on the effectiveness of our internal control over financial reporting.

The requirements of Section 404 are ongoing and also apply to future years. We expect that our internal control over financial reporting will continue to evolve as our business develops. Although we are committed to continue to improve our internal control processes and we will continue to diligently and vigorously review our internal control over financial reporting in order to ensure compliance with Section 404 requirements, any control system, regardless of how well designed, operated and evaluated, can provide only reasonable, not absolute, assurance that its objectives will be met. Therefore, we cannot be certain that material weaknesses or significant deficiencies will not exist or otherwise be discovered in the future. If material weaknesses or other significant deficiencies occur, such weaknesses or deficiencies could result in misstatements of our results of operations, restatements of our financial statements, a decline in our stock price, or other material adverse effects on our business, reputation, results of operations, financial condition or liquidity.

RISKS RELATED TO COMPETITIVE FACTORS

Competitors may develop products, product candidates or technologies that are superior to or more cost-effective than ours, which may significantly impact the development and commercial viability of imetelstat, which would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

The pharmaceutical and biotechnology industries are characterized by intense and dynamic competition with rapidly advancing technologies and a strong emphasis on proprietary products. While we believe our proprietary oligonucleotide chemistry; experience with the biological mechanisms related to imetelstat, telomeres and telomerase; clinical data to date indicating potential disease-modifying activity with imetelstat treatment; and knowledge and expertise around the development of potential treatments for hematologic myeloid malignancies provide us with competitive advantages, we face competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions and governmental agencies and public and private research institutions. Imetelstat will compete, if approved, with other products and therapies that currently exist, are being developed or will in the future be developed, some of which we may not currently be aware.

If approved for commercial sale for the treatment of lower risk MDS, imetelstat would compete against a number of currently existing therapies, including ESAs and other hematopoietic growth factors that are indicated for anemia; immunomodulators, such as Revlimid (lenalidomide) by Celgene Corporation, a Bristol-Myers Squibb Corporation, or Celgene; hypomethylating agents, such as Vidaza (azacitidine) by Celgene or other manufacturers of generic azacitidine, and Dacogen (decitabine) by Otsuka America Pharmaceutical, Inc. and other manufacturers in the United States and Janssen in the EU.

Other therapies currently in Phase 3 development in lower risk MDS, some of which may obtain regulatory approval earlier than imetelstat include, Reblozyl (luspatercept), a TGF-beta inhibitor, by Acceleron Pharma, Inc., or Acceleron, in collaboration with Celgene, whose new drug application (NDA) has been submitted to the FDA for potential approval; oral versions of azacitidine by Celgene; roxadustat, a hypoxia-inducible factor prolyl hydroxylase inhibitor, by FibroGen, Inc.; and APR-246, an activator of p53 protein, by Aprea Therapeutics, Inc.

If approved for commercial sale for the treatment of MF, imetelstat would compete against currently approved JAK inhibitors, Jakafi (ruxolitinib) by Incyte Corporation and Inrebic (fedratinib) by Celgene. Other treatment modalities for MF include hydroxyurea for the management of splenomegaly, leukocytosis, thrombocytosis and constitutional symptoms; splenectomy and splenic irradiation for the management of splenomegaly and co-existing

cytopenias, or low blood cell counts; chemotherapy and pegylated interferon. Drugs for the treatment of MF-associated anemia include ESAs, androgens, danazol, corticosteroids, thalidomide and lenalidomide.

Other therapies currently in Phase 3 development in Intermediate-2 or High-Risk myelofibrosis, some of which may obtain regulatory approval earlier than imetelstat include pacritinib, a JAK inhibitor, by CTI Biopharma, and momelotinib, a JAK inhibitor, by Sierra Oncology. Non-JAK inhibitor approaches for MF currently under investigation that could compete with imetelstat in the future include CPI-0610, a BET inhibitor, by Constellation Pharmaceuticals, Inc.; luspatercept, a TGF-beta inhibitor, by Acceleron, in collaboration with Celgene; PRM-151, an anti-fibrosis antibody, by Promedior, Inc.; navitoclax , a BCLXL, BCL-2 and BCLW inhibitor, by AbbVie; LCL 161, an inhibitor of apoptosis protein (IAP), by Novartis; and KRT-232, an inhibitor of MDM2, by Kartos Therapeutics, Inc.

Smaller companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. We anticipate increased competition in the future as new companies explore treatments for hematologic myeloid malignancies, which may significantly impact the commercial viability of imetelstat. Academic institutions, government agencies and other public and private research organizations may also conduct research, seek patent protection and establish collaborative arrangements for research, clinical development and marketing of products similar to imetelstat. These companies and institutions compete with us in recruiting and retaining qualified development and management personnel as well as in acquiring technologies complementary to the imetelstat program.

Many of our competitors, either alone or with their strategic partners, could have substantially greater financial, technical and human resources than we do and significantly greater experience in obtaining FDA and other regulatory approvals of treatments and commercializing those treatments. We believe that the commercial success of imetelstat is subject to a number of factors, including,

- product efficacy and safety;
- method of product administration;
- cost of manufacturing;
- the timing and scope of regulatory consents;
- status of coverage and level of reimbursement;
- level of generic competition
- price; and
- patent position, including potentially dominant patent positions of others.

As a result of the foregoing, competitors may develop more commercially desirable or affordable products than imetelstat, or achieve earlier patent protection or product commercialization than we may be able to achieve with imetelstat. Competitors have developed, or are in the process of developing, technologies that are, or in the future may be, competitive to imetelstat. Some of these products may have an entirely different approach or means of accomplishing therapeutic effects similar or superior to those that may be demonstrated by imetelstat. Competitors may develop products that are safer, more effective, or less costly than imetelstat, or more convenient to administer to patients and, therefore, present a serious competitive threat to imetelstat. In addition, competitors may price their products below what we may determine to be an acceptable price for imetelstat, may receive better third-party payor coverage and/or reimbursement, or may be more cost-effective than imetelstat. Such competitive products or activities by competitors may render imetelstat obsolete, which may cause us to cease any further development or future commercialization of imetelstat, which would severely and adversely affect our financial results, business and business prospects, and the future of imetelstat, and might cause us to cease operations.

To be commercially successful, imetelstat must be accepted by the health care community, which can be very slow to adopt or unreceptive to new technologies and products.

If approved for marketing, imetelstat may not achieve market acceptance since hospitals, physicians, patients or the medical community in general may decide not to accept and utilize imetelstat. If approved for commercial sale, imetelstat will compete with a number of conventional and widely accepted drugs and therapies manufactured and marketed by major pharmaceutical companies. The degree of market acceptance of imetelstat will depend on a number of factors, including:

- the clinical indications for which imetelstat is approved;
- the country and/or regions within which imetelstat is approved;
- the establishment and demonstration to the medical community of the clinical efficacy and safety of imetelstat;
- the ability to demonstrate that imetelstat is superior to alternatives on the market at the time;
- the ability to establish in the medical community the potential advantages of imetelstat over alternative treatment methods, including with respect to efficacy, safety, cost or route of administration;
- the label and promotional claims allowed by the FDA or other regulatory authorities for imetelstat, if any;
- the timing of market introduction of imetelstat as well as competitive products;
- the effectiveness of sales, marketing and distribution support for imetelstat;
- the pricing of imetelstat;
- the availability of coverage and adequate reimbursement by government and third-party payors; and
- the willingness of patients to pay out-of-pocket in the absence of coverage by third-party payors, including governmental authorities.

The established use of conventional products competitive with imetelstat may limit or preclude the potential for imetelstat to receive market acceptance upon any commercialization. We may be unable to demonstrate any pharmacoeconomic advantage for imetelstat compared to established or standard-of-care therapies, or newly developed therapies, for hematologic myeloid malignancies. Third-party payors may decide that any potential improvement that imetelstat may provide to clinical outcomes in hematologic myeloid malignancies is not adequate to justify the costs of treatment with imetelstat. If the health care community does not accept imetelstat for any of the foregoing reasons, or for any other reason, our ability to further develop or potentially commercialize imetelstat may be negatively impacted or precluded altogether, which would seriously and adversely affect our business and business prospects, and might cause us to cease operations.

If acceptable prices or adequate reimbursement for imetelstat is not obtained, the use of imetelstat could be severely limited.

The ability to successfully commercialize imetelstat, if approved, will depend significantly on obtaining acceptable prices and the availability of coverage and adequate reimbursement to the patient from third-party payors. Government payors, such as the Medicare and Medicaid programs, and other third-party payors, such as private health insurers and health maintenance organizations, determine which medications they will cover and the reimbursement levels. Assuming we obtain coverage for imetelstat by a third-party payor, the resulting reimbursement payment rates may not be adequate or may require co-payments that patients find unacceptably high. If imetelstat is approved for commercial sale, patients are unlikely to use it unless coverage is provided, and reimbursement is adequate to cover all or a significant portion of its cost. Therefore, coverage and adequate reimbursement will be critical to new product acceptance.

Government authorities and other third-party payors are developing increasingly sophisticated methods of controlling healthcare costs, such as by limiting coverage and the amount of reimbursement for particular medications. Increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices as a condition of coverage, are using restrictive formularies and preferred drug lists to

leverage greater discounts in competitive classes, and are challenging the prices charged for medical products. Further, no uniform policy requirement for coverage and reimbursement for drug products exists among third-party payors in the United States. Therefore, coverage and reimbursement for drug products can differ significantly from payor to payor. 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 imetelstat to each payor separately, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance.

We cannot be sure that coverage and reimbursement will be available for imetelstat, if approved for commercial sale, and, if reimbursement is available, what the level of reimbursement will be. There may also be significant delays in obtaining coverage and reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the drug is approved by the FDA or comparable foreign regulatory authorities. Coverage and reimbursement may impact the demand for, or the price of, any product candidate for which marketing approval is obtained. If coverage and reimbursement are not available or reimbursement is available only to limited levels, we may not successfully commercialize imetelstat, even if marketing approval is obtained, which would negatively impact our business and business prospects.

The adoption of health policy changes and health care reform in the United States may adversely affect our business and financial results.

In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could impact our business. Also, there has been increasing legislative and enforcement interest in the United States with respect to drug pricing, including specialty drug pricing practices, in light of the rising cost of prescription drugs and biologics. Specifically, there have been several recent U.S. Congressional inquiries and federal and state legislative activity designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, reduce the price of drugs under Medicare, and reform government program reimbursement methodologies for. While a number of reform measures may require additional authorization to become effective, Congress and the Trump Administration have each indicated that they will continue to seek new legislative and/or administrative measures to control drug costs. If future legislation were to impose direct governmental price controls and access restrictions, it could have a significant adverse impact on our business and financial results. Managed care organizations, as well as Medicaid and other government agencies, continue to seek price discounts. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biologic 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, to encourage importation from other countries and bulk purchasing. Due to the volatility in the current economic and market dynamics, we are unable to predict the impact of any unforeseen or unknown legislative, regulatory, payor or policy actions, which may include cost containment and healthcare reform measures. Such policy actions could have a material adverse impact on future worldwide sales of imetelstat, if approved. For a discussion of health reform activity, see Item 1 “Business—Government Regulation—Reimbursement and Healthcare Reform.”

Cost control initiatives also could decrease the price that we may receive for imetelstat in the future. If imetelstat is not considered cost-effective or adequate third-party reimbursement for the users of imetelstat cannot be obtained, then we may be unable to maintain price levels sufficient to realize an appropriate return on our investment in imetelstat. Any of these events would severely and adversely affect our financial results, business and business prospects, and might cause us to cease operations.

If we fail to comply with federal, state and foreign healthcare laws, including fraud and abuse, transparency, and health information privacy and security laws, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.

Our business operations and current and future arrangements with investigators, healthcare professionals, consultants, third-party payors and customers, may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations, including federal and state fraud and abuse laws, including anti-kickback and false claims laws; data privacy and security laws; and transparency laws related to payments and/or other transfers of value made to physicians, other healthcare professionals and teaching hospitals. These laws may constrain the business or financial arrangements and relationships through which we conduct our operations, including how we

research, market, sell and distribute any product of ours for which marketing approval is obtained. For details regarding the restrictions under applicable federal and state healthcare laws and regulations that may affect our ability to operate see Item 1 "Business—Government Regulation— Fraud and Abuse, Data Privacy and Security, and Transparency Laws and Regulations." Additionally, efforts to ensure that our current and future business arrangements will comply with applicable healthcare, privacy and data security laws and regulations will involve substantial costs. For example, the GDPR, which became effective on May 25, 2018, imposes several requirements relating to the consent of the individuals to whom the personal data relates, the information provided to the individuals, the security and confidentiality of the personal data, data breach notification and the use of third-party processors in connection with the processing of personal data. The GDPR also imposes strict rules on the transfer of personal data out of the EU, provides an enforcement authority and authorizes the imposition of large penalties for noncompliance, including the potential for fines of up to €20 million or 4% of the annual global revenues of the noncompliant company, whichever is greater. The GDPR has increased our responsibility and potential liability in relation to personal data that we process or control compared to prior EU law, including in clinical trials, and we may be required to put in place additional mechanisms to ensure compliance with the GDPR, which could divert management's attention and increase our cost of doing business. Likewise, we expect that there will continue to be new proposed laws, regulations and industry standards relating to privacy and data protection in the United States, the EU and other jurisdictions, such as the California Consumer Privacy Act of 2018, which has been characterized as the first "GDPR-like" privacy statute enacted in the United States because it mirrors a number of the key provisions in the GDPR, became effective on January 1, 2020, and we cannot determine the impact such laws, regulations and standards will have on our business. In any event, it is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations, agency guidance or case law involving applicable healthcare or privacy laws, including the GDPR, 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. If our operations are found to be in violation of any of these or any other healthcare and privacy-related regulatory laws that may apply to us, we may be subject to significant penalties, including the imposition of significant civil, criminal and administrative penalties, damages, monetary fines, disgorgement, imprisonment, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, reputational harm, diminished profits and future earnings, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, and curtailment of our operations, any of which could adversely affect our ability to operate our business and our results of operations. Defending against any such actions can be costly, time-consuming and may require significant financial and personnel resources. Therefore, even if we are successful in defending against any such actions that may be brought against us, our business may be impaired.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We have an operating lease for our office space at 149 Commonwealth Drive, Menlo Park, California, or the Menlo Park Lease, that was due to expire in January 2020. In September 2019, we amended this lease agreement to extend the lease term by two months to the end of March 2020.

In April 2019, we entered into an operating lease agreement for office space located at 3 Sylvan Way, Parsippany, New Jersey, or the New Jersey Lease. The initial term of the New Jersey Lease is 11 years with an option to extend for an additional five years and a one-time option to terminate the New Jersey Lease without cause as of the 103rd month anniversary of the commencement date of the lease. The New Jersey Lease commenced on October 1, 2019, upon our control of the office space on that date.

In October 2019, we entered into an operating lease agreement for office space located at 919 East Hillsdale Boulevard, Foster City, California, or the Foster City Lease. The initial term of the Foster City Lease is 87 months with an option to extend for an additional five years. We have not yet occupied the space as it is being renovated for

our use. The Foster City Lease term commences upon the earlier of the date of completion of the construction work or the date upon which we occupy and use the space for its intended purpose. The purpose of the Foster City Lease is to replace our current leased premises at 149 Commonwealth Drive, Menlo Park, California. We expect to occupy the space by mid-March 2020.

ITEM 3. LEGAL PROCEEDINGS

On January 23 and February 14, 2020 , putative securities class action lawsuits were commenced in the United States District Court for the Northern District of California, naming as defendants us and one of our officers. On March 5, 2020, a third putative securities class action lawsuit was commenced in the United Stated District Court for the District of New Jersey, naming as defendants us and two of our officers. All three lawsuits allege violations of the Securities Exchange Act of 1934 in connection with allegedly false and misleading statements made by us related to IMbark during the period from March 19, 2018 to September 26, 2018. The plaintiffs allege, among other things, that we failed to disclose facts related to the alleged failure by IMbark to meet the two primary endpoints of the trial, spleen response rate and Total Symptom Score, and that our stock price dropped when such information was disclosed. The plaintiffs seek damages and interest, and an award of reasonable costs, including attorneys' fees. It is possible that additional suits will be filed, or allegations made by stockholders, with respect to these same or other matters and also naming us and/or our officers and directors as defendants. We believe that we have meritorious defenses and intend to vigorously defend against the pending lawsuits.

The pending lawsuits and any other related lawsuits are subject to inherent uncertainties, and the actual defense and disposition costs will depend upon many unknown factors. The outcome of the pending lawsuits and any other related lawsuits is necessarily uncertain. We could be forced to expend significant resources in the defense of the pending lawsuits and any additional lawsuits, and we may not prevail. In addition, we may incur substantial legal fees and costs in connection with such lawsuits. We currently are not able to estimate the possible cost to us from these matters, as the pending lawsuits are currently at an early stage, and we cannot be certain how long it may take to resolve the pending lawsuits or the possible amount of any damages that we may be required to pay. Such amounts could be material to our financial statements if we do not prevail in the defense of the pending lawsuits and any other related lawsuits, or even if we do prevail.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR THE REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock is quoted on the Nasdaq Global Select Market under the symbol GERN. As of March 2, 2020, there were approximately 520 stockholders of record of our common stock. This number does not include "street name" or beneficial holders, whose shares are held of record by banks, brokers and other financial institutions.

Dividend Policy

We have never paid cash dividends on our capital stock and do not anticipate paying cash dividends in the foreseeable future, but intend to retain our capital resources for reinvestment in our business. Any future determination to pay cash dividends will be at the discretion of the board of directors and will be dependent upon our financial condition, results of operations, capital requirements and other factors our board of directors deems relevant.

Recent Sales of Unregistered Securities

During the year ended December 31, 2019, there were no unregistered sales of equity securities by us.

ITEM 6. SELECTED FINANCIAL DATA

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

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

The following discussion should be read in conjunction with the section entitled "Business" in Part I, Item 1 and the audited financial statements and notes thereto included in Part II, Item 8 of this annual report on Form 10-K. The information provided should be reviewed in the context of the sections entitled "Risks Related to the Development of Imetelstat", "Risks Related to Transition of the Imetelstat Program to Geron" and "Risks Related to Regulatory Compliance Matter and Commercialization of Imetelstat" in Part I, Item 1A entitled "Risk Factors" and elsewhere in this annual report on Form 10-K.

Business Overview

We are a late-stage clinical biopharmaceutical company that is focused on the development and potential commercialization of imetelstat, an innovative therapeutic for hematologic myeloid malignancies. We have global rights to imetelstat, a first-in-class telomerase inhibitor, which was discovered and developed at Geron. We believe targeting telomerase has the potential to inhibit the uncontrolled proliferation of malignant progenitor cells in hematologic myeloid malignancies to reduce dysfunctional blood cell production and enable recovery of normal blood cell production. Data reported from our Phase 2/3 clinical trial in lower risk myelodysplastic syndromes, or MDS, indicate imetelstat may induce meaningful and durable transfusion independence and increases in hemoglobin levels, suggesting potential recovery of normal blood cells occurring in the bone marrow, or hematopoiesis. In addition, data reported from our Phase 2 clinical trial in relapsed/refractory myelofibrosis, or MF, suggest imetelstat potentially improves overall survival, or OS, in MF. We believe these data, taken together, suggest potential disease-modifying activity from imetelstat treatment.

Imetelstat has been granted both Orphan Drug and Fast Track designations by the United States Food and Drug Administration, or FDA, for the treatment of patients with Low or Intermediate-1 risk MDS, or lower risk MDS, and for the treatment of patients with Intermediate-2 or High-risk MF relapsed after or refractory to janus kinase inhibitor treatment, or relapsed/refractory MF.

Myelodysplastic Syndromes (MDS)

We are currently conducting IMerge, our Phase 2/3 clinical trial in lower risk MDS. The ongoing Phase 3 portion of IMerge is a randomized and placebo-controlled trial that, based on discussions with United States, or U.S., and European regulatory authorities, we expect will support, if successful, the registration of imetelstat in lower risk MDS. Many key aspects from the Phase 2 portion of IMerge remained the same for the Phase 3 portion, including the primary and secondary endpoints, the dose and schedule of imetelstat administration, and patient eligibility criteria. We expect the Phase 3 trial to be conducted at multiple medical centers globally, including North America, Europe, Middle East and Asia. As of the end of February 2020, approximately 63% of the planned sites were opened for enrollment. The Phase 3 portion of IMerge opened to new patient enrollment in August 2019 and the first patient was dosed in October 2019. We plan to complete patient enrollment in the Phase 3 portion of IMerge by the end of 2020 and expect top-line results by mid-year 2022.

The Phase 2 portion of IMerge is closed to enrollment, and patients remaining in the treatment phase continue to receive imetelstat treatment. We expect more mature data, including treatment and follow-up, from the patients remaining in the Phase 2 portion of IMerge to be available in 2020 and expect to present such data at a future medical conference in 2020.

Myelofibrosis (MF)

In the fourth quarter of 2019, we conducted an End of Phase 2 meeting with the FDA to discuss the results of IMbark, our Phase 2 clinical trial in relapsed/refractory MF. Based on feedback from the meeting, we plan to submit Phase 3 trial design proposals in MF to the FDA, and, in the second quarter of 2020, to have further discussions with the FDA regarding a potential regulatory approval path, if any, for imetelstat in MF. Subsequent to these additional discussions, and after considering the timing and resources required, as well as other clinical development opportunities for imetelstat, we plan to make a decision regarding potential late-stage development of imetelstat in MF by mid-year 2020.

In February 2020, we closed IMbark, our Phase 2 clinical trial in relapsed/refractory MF, since we believe we have obtained sufficient data from the trial to support potential late-stage development in MF. As of the end of February 2020, no further follow-up of remaining patients is being conducted.

Other Indications

In 2020, we plan to expand the imetelstat program through the commencement of a potential proof-of-concept study in Intermediate-2 or High-risk, or higher risk, MDS and acute myeloid leukemia and expect to commence such a study by the end of the fourth quarter of 2020.

Recent Data from IMerge (Ongoing Phase 2/3 Trial in Lower Risk MDS)

In June 2019, we reported updated results from the Phase 2 portion of IMerge in which 42% of patients experienced red blood cell transfusion independence for at least 8 consecutive weeks, or an 8-week RBC-TI rate. Importantly, this 8-week RBC-TI rate was observed in patients with red blood cell transfusion burdens of greater than or equal to four units per eight weeks prior to starting treatment with imetelstat. Higher transfusion burdens are considered an indicator of a more difficult to treat patient population. Patients enrolled in the Phase 2 portion of IMerge had a baseline median red blood cell transfusion burden of eight units per eight weeks with a range of four to 14 units. Our results compare favorably to currently used treatments in a similar patient population. Hypomethylating agents, or HMAs, and lenalidomide have been used to improve anemia, but with limited success, such as reported 8-week RBC-TI rates of 17% for azacitidine, an HMA, and 27% for lenalidomide. In addition, 29% of patients in the Phase 2 portion of IMerge experienced a durable response, as reflected by achieving a 24-week RBC-TI, and 75% of patients who achieved an 8-week RBC-TI reported a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval. We believe these data indicate potential recovery of normal hematopoiesis and suggest potential disease-modifying activity of imetelstat treatment for these patients.

Recent Data from IMbark (Closed Phase 2 Trial in Relapsed/Refractory MF)

Also in June 2019, an analysis was presented of the OS in relapsed/refractory MF patients treated with imetelstat 9.4 mg/kg in IMbark, compared to OS calculated from real world data, or RWD, collected at the Moffitt Cancer Center for patients who had discontinued treatment with ruxolitinib, a janus kinase, or JAK, inhibitor, and who were subsequently treated with best available therapy, or BAT. To make a comparison between the IMbark data and RWD, a cohort from the real-world dataset was identified that closely matched the IMbark patients, using guidelines for inclusion and exclusion criteria as defined in the IMbark clinical protocol, such as platelet count and spleen size. Calculations from two propensity score analysis approaches resulted in a median OS of 30.7 months for the imetelstat-treated patients from IMbark, which is more than double the median OS of 12.0 months using RWD for patients treated with BAT. These analyses also indicated a 65-67% lower risk of death for the imetelstat-treated patients vs. BAT-treated patients. We believe these analyses suggest favorable OS for imetelstat-treated relapsed/refractory MF patients, compared to BAT in closely-matched patients from RWD.

In February 2020, we closed IMbark since we believe we have obtained sufficient data from the trial to support potential late-stage development of imetelstat in MF. As of the end of February 2020, no further follow-up of remaining patients is being conducted.

Transition of Imetelstat Program to Geron

As of the end of September 2019, the transition of the imetelstat program to us from our former collaboration partner, Janssen Biotech, Inc., or Janssen, was completed. For a further discussion of the former Collaboration Agreement with Janssen, see Note 4 on License Agreements in Notes to Financial Statements of this Form 10-K. Information about the transition of the imetelstat program from Janssen to us should be reviewed in the context of the section entitled "Risks Related to Transition of the Imetelstat Program to Geron" included in Part I, Item 1A, "Risk Factors" of this Form 10-K.

Financial Overview

We had approximately $159.2 million in cash, cash equivalents, restricted cash and current and noncurrent marketable securities as of December 31, 2019. We will require substantial additional capital in order to further advance the imetelstat program, including conducting the research and development and clinical and regulatory activities necessary to bring imetelstat to market, such as completing the Phase 3 portion of IMerge and potential clinical trials in other indications, and establishing sales and marketing capabilities to commercialize imetelstat in the United States, if regulatory approval is granted. If approved for marketing by regulatory authorities, we plan to seek potential commercialization partners for territories outside of the United States. While we reported a small profit for the year ended December 31, 2015 due to our recognition of revenue in connection with the upfront payment from Janssen under the Collaboration Agreement, until 2015 we had never been profitable, and have not reported any profit since. We have incurred significant net losses since our inception in 1990, resulting principally from costs incurred in connection with our research and development activities and from general and administrative costs associated with our operations. As of December 31, 2019, we had an accumulated deficit of $1.1 billion. Since our inception, we primarily have financed our operations through the sale of equity securities, interest income on our marketable securities and payments we received under our collaborative and licensing arrangements.

Substantially all of our revenues to date have been payments under collaborative agreements, and milestones, royalties and other revenues from our licensing arrangements. We currently have no source of product revenue. The significance of future losses, future revenues and any potential future profitability will depend primarily on the clinical and commercial success of imetelstat. In any event, imetelstat will require significant additional clinical testing prior to possible regulatory approval in the United States and other countries. In addition, as a result of the termination of the Collaboration Agreement, we expect research and development expenses, general and administrative expenses, and losses to substantially increase in future periods as we continue to advance the imetelstat development program. We do not expect imetelstat to be commercially available for many years, if at all.

Critical Accounting Policies and Estimates

Our financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these financial statements requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses. Note 1 of Notes to Financial Statements describes the significant accounting policies used in the preparation of our financial statements. Certain of these significant accounting policies are considered to be critical accounting policies, as defined below.

A critical accounting policy is defined as one that is both material to the presentation of our financial statements and requires management to make difficult, subjective or complex judgments that could have a material effect on our financial condition and results of operations. Specifically, critical accounting estimates have the following attributes: (i) we are required to make assumptions about matters that are highly uncertain at the time of the estimate; and (ii) different estimates we could reasonably have used, or changes in the estimate that are reasonably likely to occur, would have a material effect on our financial condition or results of operations.

Estimates and assumptions about future events and their effects cannot be determined with certainty. We base our estimates on historical experience and on various other assumptions believed to be applicable and reasonable under the circumstances. These estimates may change as new events occur, as additional information is obtained and as our operating environment changes. These changes historically have been minor and have been included in the financial statements as soon as they became known. Based on a critical assessment of our accounting policies and the underlying judgments and uncertainties affecting the application of those policies, management believes that our

financial statements are stated fairly in accordance with accounting principles generally accepted in the United States, and meaningfully present our financial condition and results of operations.

We believe the following critical accounting policies reflect our more significant estimates and assumptions used in the preparation of our financial statements:

Fair Value of Financial Instruments

We categorize financial instruments recorded at fair value on our balance sheets based upon the level of judgment associated with inputs used to measure their fair value. The categories are as follows:

Level 1—Inputs are unadjusted, quoted prices in active markets for identical assets or liabilities at the measurement date. An active market for the asset or liability is a market in which transactions for the asset or liability occur with sufficient frequency and volume to provide pricing information on an ongoing basis.

Level 2—Inputs (other than quoted market prices included in Level 1) are either directly or indirectly observable for the asset or liability through correlation with market data at the measurement date and for the duration of the instrument's anticipated life.

Level 3—Inputs reflect management's best estimate of what market participants would use in pricing the asset or liability at the measurement date. Consideration is given to the risk inherent in the valuation technique and the risk inherent in the inputs to the model.

A financial instrument's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement. Following is a description of the valuation methodologies used for financial instruments measured at fair value on our balance sheets, including the category for such financial instruments.

Financial instruments classified as Level 1 include money market funds and certificates of deposit, representing approximately 4% of our total financial instruments classified as assets measured at fair value as of December 31, 2019. Financial instruments classified as Level 2 include commercial paper, U.S. government-sponsored enterprise securities, corporate notes and equity investments, representing approximately 96% of our total financial instruments classified as assets measured at fair value as of December 31, 2019. The price for each security at the measurement date is derived from various sources. Periodically, we assess the reasonableness of these sourced prices by comparing them to the prices provided by our portfolio managers from broker quotes as well as reviewing the pricing methodologies used by our portfolio managers. Historically, we have not experienced significant deviation between the sourced prices and our portfolio managers' prices.

For a further discussion regarding fair value measurements, see Note 2 on Fair Value Measurements in Notes to Financial Statements of this annual report on Form 10-K.

Leases

On January 1, 2019, we adopted the provisions of Accounting Standards Codification 2016-02, *Leases* (*Topic 842*), or ASU 2016-02, using the modified retrospective transition method as discussed in the subsection entitled, "New Accounting Pronouncements – Recently Adopted", in Note 1 of Notes to Financial Statements of this Form 10-K. Financial results for the reporting periods beginning after January 1, 2019 are presented under Topic 842, while prior period amounts have not been adjusted and continue to be reported in accordance with our historical accounting under Accounting Standards Codification Topic 840, *Leases*, or Topic 840.

At the inception of an arrangement, we determine whether the arrangement is or contains a lease based on the unique facts and circumstances present. Operating leases are included in operating lease, right-of-use assets and lease liabilities in our balance sheets. Right-of-use assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease liabilities and their corresponding right-of-use assets are recorded based on the present value of remaining lease payments over the expected lease term. The present value of remaining lease payments within the 12 months following the balance sheet date are classified as current lease liabilities. The present value of lease payments not

within the 12 months following the balance sheet date are classified as noncurrent lease liabilities. The interest rate implicit in lease contracts to calculate the present value is typically not readily determinable. As such, significant management judgment is required to estimate the incremental borrowing rate, which is the rate incurred to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment as of the lease commencement date. If the basis for the incremental borrowing rate estimate were to change, then the present value of remaining lease payments could differ significantly which would affect the value recognized for the right-of-use assets and corresponding lease liabilities on our balance sheet. See Note 7 on Operating Leases for further discussion of our operating lease obligations.

Revenue Recognition

Beginning January 1, 2018, we recognize revenue in accordance with the provisions of Accounting Standards Codification Topic 606, *Revenue from Contracts with Customers*, or Topic 606. In determining the appropriate amount and timing of revenue to be recognized under Topic 606, we perform the following five steps: (i) identify the contract(s) with our customer; (ii) identify the promised goods or services in the agreement and determine whether they are performance obligations, including whether they are distinct in the context of the agreement; (iii) measure the transaction price, including the constraint on variable consideration; (iv) allocate the transaction price to the performance obligations based on stand-alone selling prices; and (v) recognize revenue when (or as) we satisfy each performance obligation. Significant management judgment is required to determine the level of effort required and the period over which completion of the performance obligations is expected under an agreement. If reasonable estimates regarding when performance obligations are either complete or substantially complete cannot be made, then revenue recognition is deferred until a reasonable estimate can be made. Revenue is then recognized over the remaining estimated period of performance using the cumulative catch-up method. Amounts expected to be recognized as revenue within the 12 months following the balance sheet date are classified as current deferred revenue. Amounts not expected to be recognized as revenue within the 12 months following the balance sheet date are classified as noncurrent deferred revenue.

We allocate the total transaction price to each performance obligation based on the estimated relative stand-alone selling prices of the promised goods or services underlying each performance obligation. Estimated selling prices for license rights are calculated using an income approach model and include the following key assumptions, judgments and estimates: the development timeline, revenue forecast, commercialization expenses, discount rate and probabilities of technical and regulatory success.

Our revenues historically have consisted of collaboration revenue and license fees and royalties. Collaboration revenue primarily represented amounts earned under the Collaboration Agreement with Janssen for the imetelstat program. Effective September 28, 2018, the Collaboration Agreement with Janssen was terminated. As a result, we will not receive any milestone payments or royalties from Janssen for the development or commercialization of imetelstat. License fees and royalty revenue primarily represents amounts earned under agreements that out-license our technology to various oncology, diagnostics, research tools and biologics production companies. Economic terms in these agreements may include non-refundable upfront license payments in cash or equity securities, annual license maintenance fees, cost sharing arrangements, milestone payments, royalties on future sales of products, or any combination of these items. Non-refundable upfront fees, annual license maintenance fees and funding of research and development activities are considered fixed, while milestone payments and royalties are identified as variable consideration.

Licenses of Intellectual Property. If we determine the license to intellectual property is distinct from the other performance obligations identified in the agreement and the licensee can use and benefit from the license, we recognize revenue from non-refundable upfront fees allocated to the license upon the completion of the transfer of the license to the licensee. For such licenses, we recognize revenue from annual license maintenance fees upon the start of the new license period. For licenses that are bundled with other performance obligations, we assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable upfront fees or annual license maintenance fees. At each reporting period, we reassess the progress and, if necessary, adjust the measure of performance and related revenue recognition.

Milestone Payments. At the inception of each agreement that includes milestone payments, we evaluate whether the milestones are considered probable of being achieved and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the value of the associated milestone is included in the transaction price. For milestones that we do not deem to be probable of being achieved, the associated milestone payments are fully constrained and the value of the milestone is excluded from the transaction price with no revenue being recognized. Milestone payments that are not within our control, such as regulatory-related accomplishments, are not considered probable of being achieved until those accomplishments have been communicated by the relevant regulatory authority. Once the assessment of probability of achievement becomes probable, we recognize revenue for the milestone payment. At each reporting period, we assess the probability of achievement of each milestone under our current agreements.

Royalties. For agreements with sales-based royalties, including milestone payments based on the level of sales, where the license is deemed to be the predominant item to which the royalties relate, we recognize revenue at the later of: (a) when the related sales occur, or (b) when the performance obligation, to which some or all of the royalty has been allocated, has been satisfied (or partially satisfied). At each reporting period, we estimate the sales incurred by each licensee based on historical experience and accrue the associated royalty amount.

Cost Sharing Arrangements. Research and development and other expenses being shared by both parties under an agreement are recorded as earned or owed based on the performance obligations by both parties under the respective agreement. For arrangements in which we and our collaboration partner in the agreement are exposed to significant risks and rewards that depend on the commercial success of the activity, we recognize payments between the parties on a net basis and record such amounts as a reduction or addition to research and development expense. For arrangements in which we have agreed to perform certain research and development services for our collaboration partner and are not exposed to significant risks and rewards that depend on the commercial success of the activity, we recognize the respective cost reimbursements as revenue under the collaborative agreement over time in a manner proportionate to the costs we incurred to perform the services using the input method.

Revenue recognition for licenses and collaboration agreements requires significant judgment. Our assessments and estimates are based on contractual terms, historical experience and general industry practice. Revisions in these values or estimations have the effect of increasing or decreasing license fee or collaboration revenue in the period of revision. As of December 31, 2019, we have not made any revisions to revenue recognition estimates.

Clinical Trial Accruals

Our current imetelstat clinical trials are being supported by third-party contract research organizations, or CROs, and other vendors. We accrue expenses for clinical trial activities performed by CROs based upon the estimated amount of work completed on each trial. For clinical trial expenses, the significant factors used in estimating accruals include the number of patients enrolled, the number of active clinical sites, and the duration for which the patients have been enrolled in the trial. We monitor patient enrollment levels and related activities to the extent possible through internal reviews, review of contractual terms and correspondence with CROs. We base our estimates on the best information available at the time. For the clinical development activities being conducted by Janssen under the former Collaboration Agreement, we monitored patient enrollment levels and related activities to the extent possible through discussions with Janssen personnel and based our estimates of clinical trial costs on the best information available at the time. However, additional information may become available to us which will allow us to make a more accurate estimate in future periods. In that event, we may be required to record adjustments to research and development expenses in future periods when the actual level of activity becomes more certain.

Valuation of Stock-Based Compensation

We measure and recognize compensation expense for all share-based payment awards to our employees and directors, including service-based and performance-based stock options, restricted stock awards and employee stock purchases related to our Employee Stock Purchase Plan, or ESPP, based on estimated grant-date fair values for these instruments. The grant-date fair value of share-based payment awards is amortized over the vesting period of the awards using a straight-line method and reduced for estimated forfeitures. For performance-based stock options with vesting conditioned on the achievement of certain strategic milestones, stock-based compensation expense is recognized over the period from the date the performance condition is determined to be probable of occurring

through the date the applicable condition is expected to be met and is reduced for estimated forfeitures, as applicable. If the performance condition is not considered probable of being achieved, no stock-based compensation expense is recognized until such time as the performance condition is considered probable of being met, if at all. If that assessment of the probability of the performance condition being met changes, the impact of the change in estimate would be recognized in the period of the change. We use the Black Scholes option-pricing model to estimate the grant-date fair value of our service-based and performance-based stock options and employee stock purchases. The grant-date fair value for service-based restricted stock awards is determined using the fair value of our common stock on the date of grant.

Option-pricing model assumptions, such as expected volatility, expected term and risk-free interest rate, impact the fair value estimate. Expected volatilities are based on historical volatilities of our stock since traded options on our common stock do not correspond to option terms and trading volume of options is limited. The expected term of options represents the period of time that options granted are expected to be outstanding. In deriving this assumption, we review actual historical exercise and post-vesting cancellation data and the remaining outstanding options not yet exercised or cancelled. For performance-based stock options, we also assess the projected timing of potential achievement of the milestones. The expected term of employees' purchase rights under our ESPP is equal to the purchase period. The risk-free interest rate is based on the U.S. Zero Coupon Treasury Strip Yields for the expected term in effect on the date of grant. Forfeiture rates are estimated based on historical data and are adjusted, if necessary, over the requisite service period based on the extent to which actual forfeitures differ, or are expected to differ, from their estimate.

We evaluate the assumptions used in estimating grant-date fair values of our share-based payment awards by reviewing current trends in comparison to historical data on an annual basis. We have not revised the methods by which we derive assumptions in order to estimate grant-date fair values of our share-based payment awards. If factors change and we employ different assumptions in future periods, the stock-based compensation expense that we record for share-based payment awards to employees and directors may differ significantly from what we have recorded in the current period.

For our non-employee stock-based awards, the measurement date on which the fair value of the stock-based award is calculated is equal to the earlier of: (i) the date at which a commitment for performance by the counterparty to earn the equity instrument is reached or (ii) the date at which the counterparty's performance is complete.

Results of Operations

Our results of operations have fluctuated from period to period and may continue to fluctuate in the future. Results of operations for any period may be unrelated to results of operations for any other period. Thus, historical results should not be viewed as indicative of future operating results. For example, in 2015 we reported net income for the first time due to recognition of revenue in connection with the upfront payment from Janssen under the Collaboration Agreement. Effective September 28, 2018, the Collaboration Agreement with Janssen was terminated. As a result, we will not receive any milestone payments or royalties from Janssen for the development or commercialization of imetelstat. In addition, we expect to incur increasing operating losses in the future as we continue clinical development activities for imetelstat on our own to enable potential commercialization of imetelstat in the United States and other countries. We are subject to risks common to companies in our industry and at our stage of development, including, but not limited to, risks inherent in research and development efforts, including the development, manufacture, regulatory approval for and commercialization of, imetelstat, uncertainty of non-clinical and clinical trial results or regulatory approvals or clearances, the future development of imetelstat by us, including any future efficacy or safety results that may cause the benefit-risk profile of imetelstat to become unacceptable, our need for future capital, enforcement of our patent and proprietary rights, reliance upon our consultants, licensees, investigators and other third parties, and potential competition. In order for imetelstat to be commercialized, we must conduct non-clinical tests and clinical trials to demonstrate the safety and efficacy of imetelstat, obtain regulatory approvals or clearances and enter into manufacturing, distribution and marketing arrangements, as well as obtain market acceptance. We do not expect to receive revenue based on sales of imetelstat for many years, if at all.

Revenues

We have entered into several license or collaboration agreements with companies involved with oncology, diagnostics, research tools and biologics production, whereby we have granted certain rights to our non-imetelstat

related technologies. In connection with these agreements, we are eligible to receive license fees, option fees, milestone payments and royalties on future sales of products, or any combination thereof. As discussed above, we adopted Topic 606 using the modified retrospective transition method on January 1, 2018. As a result, prior period amounts have not been adjusted and continue to be reported in accordance with our historical accounting under Topic 605 and therefore, there is a lack of comparability to the prior periods presented. However, we do not expect the application of Topic 606 to have a material impact on our financial results on an ongoing basis in comparison to the results that would have been realized if we had continued to apply Topic 605.

We recognized license fee revenues of $96,000, $641,000 and $667,000 in 2019, 2018 and 2017, respectively, related to our various agreements. The decrease in license fee revenues in 2019 and 2018 primarily reflects a reduction in the number of active license agreements in 2019 and 2018 for research licenses related to our human telomerase reverse transcriptase, or hTERT, technology, due to the patent expirations on such technology. We expect the final payment under our one remaining patent license related to our telomerase technology to be made in the first quarter of 2020.

We recognized royalty revenues of $364,000, $425,000 and $398,000 in 2019, 2018 and 2017, respectively, on product sales of telomerase detection and telomere measurement kits to the research-use-only market and cell-based research products from our divested stem cell programs. The decrease in royalty revenues in 2019 compared to 2018 primarily reflects expiration of licenses which eliminated the obligation to pay royalties on product sales. The increase in royalty revenues in 2018 compared to 2017 primarily reflects a change in the method that revenue is being recognized for royalties upon the adoption of Topic 606 as of January 1, 2018. Under Topic 606, we estimate sales-based royalties earned on product sales by our licensees in each reporting period and accrue the associated royalty amount. In prior periods, revenue from royalties was being recognized when payments were received from our licensees.

In 2019, our revenues primarily were comprised of royalties on product sales of cell-based research products from our divested stem cell programs, license fees and royalties under research licenses related to our hTERT technology and license fees under a license agreement related to our specialized oligonucleotide backbone chemistry. Three customers accounted for approximately 79% of our 2019 revenue. Two customers accounted for approximately 59% and 39% of our 2018 and 2017 revenues, respectively.

Future license fee and royalty revenues are dependent on additional agreements being signed, if any, current agreements being maintained and the underlying patent rights for the licenses remaining active. We expect license fee and royalty revenues under our license agreements related to our hTERT technology to cease in 2020 due to the patent expirations on such technology. In addition, due to the termination of the Collaboration Agreement effective September 28, 2018, we will not receive any milestone payments or royalties from Janssen for the development or commercialization of imetelstat. Current revenues may not be predictive of future revenues.

Research and Development Expenses

During the years ended December 31, 2019, 2018 and 2017, imetelstat was the sole research and development program we supported. For the imetelstat research and development program, we incur direct external, personnel related and other research and development costs. For the year ended December 31, 2019, direct external expenses included costs for our contract research organizations, or CROs, consultants and other clinical-related vendors and 100% of the clinical development costs incurred by Janssen for operational support of the imetelstat program during the transition period. For the years ended December 31, 2018 and 2017, direct external expenses primarily consisted of our proportionate share of research and development costs incurred by Janssen under the Collaboration Agreement. Personnel related expenses primarily consist of salaries and wages, stock-based compensation, payroll taxes and benefits for Geron employees involved with ongoing research and development efforts. Other research and development expenses primarily consist of research-related overhead associated with allocated expenses for rent and maintenance of facilities and other supplies.

Research and development expenses were $52.1 million, $13.4 million and $11.0 million for the years ended December 31, 2019, 2018 and 2017, respectively. The increase in research and development expenses in 2019 compared to 2018 primarily reflects higher direct external costs for clinical development activities. Such costs included: a) fees to our CROs, consultants and other clinical-related vendors for imetelstat program transition; b)

start-up expenses for the Phase 3 portion of IMerge; c) 100% reimbursement to Janssen for operational support of the imetelstat program during the transition period and d) purchase of inventories of drug product, drug substance and raw materials from Janssen. In addition, personnel related expenses have increased in 2019 compared to 2018 as a result of additional development headcount being hired in 2019. The increase in research and development expenses in 2018 compared to 2017 primarily reflects higher direct external costs for our share of clinical development expenses under the former collaboration with Janssen where our share of such costs increased from 50% to 100% as of the termination date of the Collaboration Agreement, higher direct external costs for contract research services and consulting expenses and increased personnel related expenses.

Research and development expenses for the years ended December 31, 2019, 2018 and 2017 were as follows:

	Year Ended December 31,		
(In thousands)	**2019**	**2018**	**2017**
Direct external research and development expenses:			
Clinical program: Imetelstat	$ 39,263	$ 10,353	$ 8,437
Personnel related expenses	10,126	2,429	2,063
All other research and development expenses	2,683	650	533
Total	$ 52,072	$ 13,432	$ 11,033

Since cost sharing between Janssen and us for imetelstat clinical development ceased on September 28, 2018, the effective date of termination of the Collaboration Agreement, we expect research and development expenses to increase substantially in future periods as we continue to undertake sole financial responsibility for the imetelstat development program, including all ongoing or potential future clinical trials, engage third parties and other service providers to conduct clinical trials of imetelstat, and hire additional senior personnel to oversee the program. Under the terms of the Collaboration Agreement, Janssen was required to provide operational support for the imetelstat program through September 2019 during transition of the program to us, including continuing to support ongoing imetelstat clinical trials. We reimbursed Janssen for 100% of the costs for such operational support. However, costs associated with transition activities, such as transfer of the sponsorship of ongoing imetelstat clinical trials, moving databases and related systems and transmitting regulatory files, were incurred separately by each company, unless otherwise specified in the Collaboration Agreement. As of the end of September 2019, the transition of the imetelstat program to us from Janssen was completed according to the terms of the Collaboration Agreement.

At this time, we cannot provide reliable estimates of how much time or investment will be necessary to advance imetelstat toward commercialization. For a more complete discussion of the risks and uncertainties associated with the development of imetelstat, see the sub-sections entitled “Risks Related to the Development of Imetelstat” and “Risks Related to Regulatory Compliance Matters and Commercialization of Imetelstat” in Part I, Item 1A entitled “Risk Factors” and elsewhere in this annual report on Form 10-K.

General and Administrative Expenses

General and administrative expenses were $20.9 million, $18.7 million and $19.3 million for the years ended December 31, 2019, 2018 and 2017, respectively. The increase in general and administrative expenses in 2019 compared to 2018 primarily reflects higher corporate and patent legal costs and additional general and administrative personnel to support operational activities. The decrease in general and administrative expenses in 2018 compared to 2017 primarily reflects the net result of reduced personnel related expenses, including lower stock-based compensation expense, partially offset by higher consulting expenses and patent legal expenses. We expect general and administrative expenses to increase in the future as the imetelstat program matures and potential pre-commercialization preparatory activities begin.

Interest and Other Income

Interest and other income was $4.2 million, $3.3 million and $1.4 million for the years ended December 31, 2019, 2018 and 2017, respectively. The increase in interest and other income in 2019 and 2018 primarily reflects higher yields on our marketable securities portfolio and the increase in the size of our marketable securities portfolio resulting from the receipt of net cash proceeds from issuances of common stock pursuant to our At Market Issuance Sales

Agreement, or the 2015 Sales Agreement, with MLV & Co. LLC, or MLV, and our At Market Issuance Sales Agreement, or the 2018 Sales Agreement, with B. Riley FBR, Inc., or B. Riley FBR. Interest earned in future periods will depend on the size of our marketable securities portfolio and prevailing interest rates.

Gain on Settlement

In July 2018, we and the other former shareholders of ViaGen, Inc., or ViaGen, filed an arbitration claim against Trans Ova Genetics, L.C., or Trans Ova, for alleged violations under a Share Purchase Agreement, or SPA, including failure to make payments under certain conditions. In December 2018, we and the other former shareholders of ViaGen agreed to settle the dispute for a one-time payment of $3.7 million, of which we received $1.5 million, which represents our 40% share of the settlement amount. With this settlement, Trans Ova has been released from any further obligations under the SPA, including any future payments. No comparable amounts were recognized in 2019 or 2017.

Change in Fair Value of Equity Investment

With the adoption of ASU 2016-01 on January 1, 2018, we remeasure the fair value of our equity investment in Sienna Cancer Diagnostics Limited, or Sienna, at each reporting date and any resulting change in fair value based on observable price changes is included in our statements of operations. The overall decrease in the fair value of our equity investment in Sienna resulting from observable price changes in Sienna's stock was $195,000 and $541,000 for the years ended December 31, 2019 and 2018, respectively. No comparable amount was incurred in 2017. The fair value of our equity investment in Sienna fluctuates based on changes in Sienna's stock price and is therefore subject to volatility that could adversely affect our future operating results.

Other Expense

Other expense was $69,000, $154,000 and $77,000 for the years ended December 31, 2019, 2018 and 2017, respectively. Other expense reflects the net effect of foreign currency translation on our equity investment in Sienna and bank charges related to our cash operating accounts and marketable securities portfolio. Other expense for the years ended December 31, 2019 and 2018 included losses of $1,000 and $63,000, respectively, related to foreign currency translation for our equity investment in Sienna. No comparable amount was incurred in 2017. The fair value of our equity investment in Sienna fluctuates based on changes in the exchange rate between the U.S. dollar and Australian dollar and is therefore subject to volatility that could adversely affect our future operating results.

Liquidity and Capital Resources

As of December 31, 2019, we had cash, restricted cash, cash equivalents and marketable securities of $159.2 million, compared to $182.1 million at December 31, 2018. The net decrease in cash, restricted cash, cash equivalents, and current and noncurrent marketable securities in 2019 was the net result of cash being used for operations, partially offset by net proceeds of $19.3 million from sales of our common stock under the 2018 Sales Agreement in 2019. We estimate that our existing capital resources and future interest income will be sufficient to fund our current level of operations through at least the next 12 months. However, we expect to experience negative cash flow for the foreseeable future as a result of the termination of the Collaboration Agreement with Janssen and as we continue development of the imetelstat program on our own.

We have an investment policy to invest our cash in liquid, investment grade securities, such as interest-bearing money market funds, certificates of deposit, municipal securities, U.S. government and agency securities, corporate notes and commercial paper. Our investment portfolio does not contain securities with exposure to sub-prime mortgages, collateralized debt obligations, asset-backed securities or auction rate securities and, to date, we have not recognized any other-than-temporary impairment charges on our marketable securities or any significant changes in aggregate fair value that would impact our cash resources or liquidity. To date, we have not experienced lack of access to our invested cash and cash equivalents; however, access to our invested cash and cash equivalents may be impacted by adverse conditions in the financial and credit markets.

In August 2015, we entered into the 2015 Sales Agreement with MLV, under which we could elect to issue and sell shares of our common stock having an aggregate offering price of up to $50 million. Pursuant to the 2015 Sales Agreement, common stock was sold at market prices prevailing at the time of sale through MLV as our sales agent. We paid MLV an aggregate commission rate equal to up to 3.0% of the gross proceeds of the sales price per share for common stock sold through MLV under the 2015 Sales Agreement. In 2018, we sold an aggregate of 13,195,106 shares of our common stock under the 2015 Sales Agreement, resulting in net cash proceeds to us of approximately $47.7 million after deducting sales commissions and offering expenses payable by us. Under the 2015 Sales Agreement, we sold a cumulative total of 13,809,336 shares of our common stock resulting in net cash proceeds to us of approximately $48.7 million after deducting sales commissions and offering expenses payable by us. No further shares of common stock may be sold under the 2015 Sales Agreement.

In May 2018, we entered into the 2018 Sales Agreement with B. Riley FBR, pursuant to which we may elect to issue and sell shares of our common stock having an aggregate offering price of up to $100 million in such quantities and on such minimum price terms as we set from time to time through B. Riley FBR as our sales agent. Pursuant to the 2018 Sales Agreement, B. Riley FBR sells our common stock at market prices prevailing at the time of sale for which B. Riley FBR receives an aggregate commission rate equal to up to 3.0% of the gross proceeds. We sold an aggregate of 13,214,867 and 10,083,079 shares of our common stock under the 2018 Sales Agreement in 2019 and 2018, respectively, resulting in net cash proceeds to us of approximately $19.3 million and $38.4 million, respectively, after deducting sales commissions and offering expenses payable by us. In January 2020, we sold an aggregate of 530,228 shares of our common stock under the 2018 Sales Agreement resulting in net cash proceeds to us of approximately $748,000, after deducting sales commissions and offering expenses payable by us. As of March 1, 2020, approximately $40.0 million of our common stock remained available for issuance under the 2018 Sales Agreement. The 2018 Sales Agreement will expire upon the earlier of the remaining common stock being sold or May 2021.

We will require substantial additional capital in order to further advance the imetelstat program, including conducting the research and development, clinical, regulatory and potential commercialization activities necessary to bring imetelstat to market. In this regard, our ability to complete the Phase 3 portion of IMerge and to commence, conduct and complete potential future clinical trials of imetelstat, such as potential Phase 3 clinical trials in MF or potential additional proof-of-concept studies in other hematologic myeloid malignancies, is dependent on our ability to raise substantial additional capital. In addition, our ability to commercialize imetelstat in the United States, if regulatory approval is granted, depends on us being able to establish sales and marketing capabilities. Because the outcome of any clinical activities and/or regulatory approval process is highly uncertain, we cannot reasonably estimate whether any development activities we may undertake will succeed, and we may never recoup our investment in any imetelstat development, which would adversely affect our financial condition and our business and business prospects, and might cause us to cease operations. Our future capital requirements are difficult to forecast and will depend on many factors, including:

- the accuracy of the assumptions underlying our estimates for our capital needs;
- the progress, timing, magnitude, scope and costs of clinical development, manufacturing and potential commercialization of imetelstat, including the number of indications being pursued, subject to clearances and approvals by the FDA and other regulatory authorities;
- the scope, progress, duration, results and costs of current and potential future clinical trials, including the Phase 3 portion of IMerge, potential Phase 3 clinical trials in MF and potential proof-of-concept studies in other hematologic myeloid malignancies, as well as non-clinical studies and assessments, of imetelstat;
- the costs, timing and outcomes of regulatory reviews or other regulatory actions related to imetelstat, such as submitting Phase 3 trial design proposals in MF and conducting further discussions with the FDA regarding a potential regulatory approval path in MF, as well as obtaining regulatory clearances and approvals in the United States and in other countries;
- the costs of preparing, filing and prosecuting patent applications and maintaining, enforcing and defending intellectual property-related claims;
- the costs of manufacturing imetelstat, including our ability to achieve any meaningful reduction in manufacturing costs;

- the costs of multiple third-party vendors and service providers, including our CROs and CMOs, to pursue the development, manufacturing and potential commercialization of imetelstat;
- our ability to establish, enforce and maintain collaborative or other strategic arrangements for research, development, clinical testing and manufacturing of imetelstat and potential future commercialization and marketing;
- our ability to successfully market and sell imetelstat, if imetelstat receives future regulatory approval or clearance, in the United States and other countries;
- our need to successfully recruit and retain additional key personnel to support the development and potential future commercialization of imetelstat;
- the costs and timing necessary to build a U.S. sales force to market and sell imetelstat, should it receive regulatory clearance;
- the sales price for imetelstat;
- the availability of coverage and adequate third-party reimbursement for imetelstat;
- expenses associated with the pending putative securities class action lawsuits and potential additional related lawsuits, as well as any other litigation;
- the extent and scope of our general and administrative expenses, including expenses associated with pending and potential future litigation; and
- the costs of maintaining and operating facilities in California and New Jersey, including higher expenses for travel, telecommunications and administrative oversight.

As a result of the termination of the Collaboration Agreement effective September 28, 2018, we are responsible for funding all clinical development, manufacturing, intellectual property maintenance and potential commercial activities for the imetelstat program. In order to further advance the imetelstat program, including completing the Phase 3 portion of IMerge and commencing, conducting and completing potential future clinical trials in other indications, such as potential Phase 3 clinical trials in MF or potential proof-of-concept studies in other hematologic myeloid malignancies, we will need to raise substantial additional capital or establish additional collaborative arrangements with third-party collaborative partners, which may not be possible. In addition, as a result of the termination of the Collaboration Agreement, we will not receive any milestone payments or royalties from Janssen for the development or sale of imetelstat, including any clinical development milestones. If we are unable to raise additional capital or establish alternative collaborative arrangements with third-party collaborative partners for imetelstat, the development of imetelstat may be further delayed, altered or abandoned, which might cause us to cease operations. Additional financing through public or private equity financings, including pursuant to our 2018 Sales Agreement with B. Riley FBR, capital lease transactions or other financing sources may not be available on acceptable terms, or at all. We may raise equity capital at a stock price or on other terms that could result in substantial dilution of ownership for our stockholders. The receptivity of the public and private equity markets to proposed financings is substantially affected by the general economic, market and political climate and by other factors which are unpredictable and over which we have no control. In this regard, volatility and instability in the global financial markets and political climate could adversely affect our ability to raise additional funds through financings and the terms upon which we may raise those funds.

In addition, we may seek additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our stockholders may be diluted, and the terms may include liquidation or other preferences that materially and adversely affect the rights of our stockholders. Debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through alliance, collaborative or licensing arrangements with third parties, we may have to relinquish valuable rights to imetelstat or our technologies or grant licenses on terms that are not favorable to us.

We cannot assure you that our existing capital resources, future interest income, and potential future sales of our common stock, including under our 2018 Sales Agreement with B. Riley FBR, will be sufficient to fund our operating plans. In any event, we will need substantial additional funds to meet operational needs and capital requirements to advance the imetelstat program in clinical development and potential commercialization, and our need for additional funds may arise sooner than planned. If adequate funds are not available on a timely basis, if at all, we may be unable to pursue further development, including completing the Phase 3 portion of IMerge, and commencing, conducting and completing potential Phase 3 clinical trials in MF, or potential proof-of-concept studies in other hematologic myeloid malignancies, or to pursue potential commercialization of imetelstat, which would severely harm our business and we might cease operations.

Cash Flows from Operating Activities

Net cash used in operations was $43.8 million, $21.0 million and $20.6 million in 2019, 2018 and 2017, respectively. The increase in net cash used in operations for in 2019 compared to 2018 primarily reflects higher payments for research and development expenses in connection with the transition of the imetelstat program from Janssen to us, start-up activities for the Phase 3 portion of IMerge, purchase of inventories of drug product, drug substance and raw materials from Janssen and increases in development headcount. The increase in net cash used in operations in 2018 compared to 2017 primarily reflects the net result of higher costs associated with business development activities, partially offset by lower payments to Janssen in 2018 under the cost sharing arrangement for imetelstat clinical development.

Cash Flows from Investing Activities

Net cash provided by investing activities in 2019 and 2017 was $27.4 million and $23.0 million, respectively. Net cash used in investing activities in 2018 was $77.7 million. Net cash provided by investing activities in 2019 and 2017 primarily reflects a higher rate of maturities than purchases of marketable securities. Net cash used in investing activities in 2018 primarily reflects a higher rate of purchases than maturities of marketable securities resulting from the investment of net cash proceeds from the sales of our common stock pursuant to the 2015 Sales Agreement with MLV and the 2018 Sales Agreement with B. Riley FBR.

For the three years ended December 31, 2019, we purchased approximately $429,000 in property and equipment, none of which was financed through equipment financing arrangements.

Cash Flows from Financing Activities

Net cash provided by financing activities in 2019, 2018 and 2017 was $19.5 million, $93.0 million and $1.1 million, respectively. Financing activities in 2019 and 2018 primarily reflect the receipt of net cash proceeds from the sales of our common stock under the 2015 Sales Agreement with MLV and the 2018 Sales Agreement with B. Riley FBR and cash proceeds from the issuance of common stock under our employee equity plans.

Significant Cash and Contractual Obligations

As of December 31, 2019, our contractual obligations for the next five years and thereafter were as follows:

	Payments Due by Period				
Contractual Obligations [1]	Total	Less Than 1 Year	1-3 Years	4 - 5 Years	After 5 Years
			(In thousands)		
Equipment lease	$ 26	$ 17	$ 9	$ —	$ —
Operating leases[2]	8,275	713	1,851	1,949	3,762
License fees[3]	200	25	50	50	75
Total contractual cash obligations	$ 8,501	$ 755	$ 1,910	$ 1,999	$ 3,837

(1) This table does not include payments under our severance plan if there were a change in control of Geron or severance payments to employees in the event of an involuntary termination. In addition, this table does not include any royalty obligations under our license agreements as the timing and likelihood of such payments are not known.

(2) In September 2019, we amended the lease agreement for our office space at 149 Commonwealth Drive, Menlo Park, California to extend the lease term by two months to the end of March 2020. In April 2019, we entered into an operating lease agreement for office space located at 3 Sylvan Way, Parsippany, New Jersey, or the New Jersey Lease. The initial term of the New Jersey Lease is 11 years with an option to extend for an additional five years and a one-time option to terminate the New Jersey Lease without cause as of the 103rd month anniversary of October 1, 2019, the commencement date of the lease. In October 2019, we entered into an operating lease agreement for office space located at 919 East Hillsdale Boulevard, Foster City, California, or the Foster City Lease. The initial term of the Foster City Lease is 87 months with an option to extend for an additional five years. We expect to occupy the office space underlying the Foster City Lease by mid-March 2020, upon which the Foster City Lease will commence. Operating lease obligations in the table above do not assume the exercise by us of any option to extend a lease or any right of termination.

(3) License fees are comprised of minimum annual license payments under our existing license agreements with universities and companies for the right to use intellectual property related to technologies that we have in-licensed.

Off-Balance Sheet Arrangements

We have not engaged in any off-balance sheet arrangements, including the use of structured finance, special purpose entities or variable interest entities.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

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

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The following financial statements and the related notes thereto, of Geron Corporation and the Report of Independent Registered Public Accounting Firm, Ernst & Young LLP, are filed as a part of this annual report on Form 10-K.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Geron Corporation

Opinion on the Financial Statements

We have audited the accompanying balance sheets of Geron Corporation (the Company) as of December 31, 2019 and 2018, the related statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated March 12, 2020 expressed an unqualified opinion thereon.

Adoption of ASU No. 2016-01

As discussed in Note 1 to the financial statements, the Company changed its method of accounting for certain equity investments due to the adoption of ASU No. 2016-01, Recognition and Measurement of Financial Assets and Financial Liabilities, and the amendment in ASU 2018-03 effective January 1, 2018.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 1992.
Redwood City, California
March 12, 2020

GERON CORPORATION

BALANCE SHEETS

	December 31, 2019	December 31, 2018
	(In thousands, except share and per share data)	
ASSETS		
Current assets:		
Cash and cash equivalents	$ 13,644	$ 10,575
Restricted cash	270	269
Marketable securities	125,681	152,714
Interest and other receivables	802	1,168
Prepaid and other current assets	1,211	1,332
Total current assets	141,608	166,058
Noncurrent marketable securities	19,651	18,582
Property and equipment, net	408	59
Operating leases, right-of-use assets	2,497	—
Deposits and other assets	1,353	585
	$ 165,517	$ 185,284
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 1,181	$ 982
Accrued compensation and benefits	4,830	2,642
Amount due to Janssen Biotech, Inc.	14,269	2,610
Operating lease liabilities	354	—
Accrued liabilities	7,528	1,317
Total current liabilities	28,162	7,551
Noncurrent operating lease liabilities	2,200	—
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, $0.001 par value; 3,000,000 shares authorized; no shares issued and outstanding at December 31, 2019 and 2018	—	—
Common stock, $0.001 par value; 450,000,000 shares authorized; 199,814,581 and 186,392,682 shares issued and outstanding at December 31, 2019 and 2018, respectively	200	186
Additional paid-in capital	1,214,835	1,189,194
Accumulated deficit	(1,080,012)	(1,011,464)
Accumulated other comprehensive gain (loss)	132	(183)
Total stockholders' equity	135,155	177,733
	$ 165,517	$ 185,284

See accompanying notes.

GERON CORPORATION

STATEMENTS OF OPERATIONS

	Year Ended December 31,		
	2019	2018	2017
	(In thousands, except share and per share data)		
Revenues:			
License fees and royalties	$ 460	$ 1,066	$ 1,065
Operating expenses:			
Research and development	52,072	13,432	11,033
General and administrative	20,893	18,707	19,287
Total operating expenses	72,965	32,139	30,320
Loss from operations	(72,505)	(31,073)	(29,255)
Interest and other income	4,221	3,291	1,416
Gain on settlement	—	1,460	—
Change in fair value of equity investment	(195)	(541)	—
Other expense	(69)	(154)	(77)
Net loss	$ (68,548)	$ (27,017)	$ (27,916)
Basic and diluted net loss per share	$ (0.36)	$ (0.15)	$ (0.18)
Shares used in computing basic and diluted net loss per share	190,160,311	176,504,996	159,224,986

See accompanying notes.

GERON CORPORATION

STATEMENTS OF COMPREHENSIVE LOSS

	Year Ended December 31,		
	2019	2018	2017
		(In thousands)	
Net loss	$ (68,548)	$ (27,017)	$ (27,916)
Net unrealized gain (loss) on marketable securities	315	24	(154)
Comprehensive loss	$ (68,233)	$ (26,993)	$ (28,070)

See accompanying notes.

GERON CORPORATION

STATEMENTS OF STOCKHOLDERS' EQUITY

	Common Stock		Additional Paid-In	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Capital	Deficit	Gain (Loss)	Equity
	(In thousands, except share data)					
Balances at December 31, 2016	159,158,636	$ 159	$1,080,198	$ (957,924)	$ (53)	$ 122,380
Net loss	—	—	—	(27,916)	—	(27,916)
Other comprehensive loss	—	—	—	—	(154)	(154)
Issuance of common stock in connection with at market offering, net of issuance costs of $114	614,230	1	1,059	—	—	1,060
Stock-based compensation related to issuance of common stock and options in exchange for services	72,066	—	200	—	—	200
Issuances of common stock under equity plans	32,307	—	51	—	—	51
Stock-based compensation for equity-based awards to employees and directors	—	—	8,144	—	—	8,144
401(k) contribution	—	—	32	—	—	32
Balances at December 31, 2017	159,877,239	160	1,089,684	(985,840)	(207)	103,797
Cumulative effect of accounting principle change	—	—	—	1,393	—	1,393
Net loss	—	—	—	(27,017)	—	(27,017)
Other comprehensive income	—	—	—	—	24	24
Issuance of common stock in connection with at market offering, net of issuance costs of $2,282	23,278,185	23	85,994	—	—	86,017
Stock-based compensation related to issuance of common stock and options in exchange for services	73,980	—	191	—	—	191
Issuances of common stock under equity plans	3,163,278	3	6,948	—	—	6,951
Stock-based compensation for equity-based awards to employees and directors	—	—	6,368	—	—	6,368
401(k) contribution	—	—	9	—	—	9
Balances at December 31, 2018	186,392,682	186	1,189,194	(1,011,464)	(183)	177,733
Net loss	—	—	—	(68,548)	—	(68,548)
Other comprehensive income	—	—	—	—	315	315
Issuance of common stock in connection with at market offering, net of issuance costs of $481	13,214,867	14	19,281	—	—	19,295
Stock-based compensation related to issuance of common stock and options in exchange for services	29,150	—	68	—	—	68
Issuances of common stock under equity plans	177,882	—	204	—	—	204
Stock-based compensation for equity-based awards to employees and directors	—	—	6,079	—	—	6,079
401(k) contribution	—	—	9	—	—	9
Balances at December 31, 2019	199,814,581	$ 200	$1,214,835	$ (1,080,012)	$ 132	$ 135,155

See accompanying notes.

GERON CORPORATION

STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2019	2018	2017
		(In thousands)	
Cash flows from operating activities:			
Net loss	$ (68,548)	$ (27,017)	$ (27,916)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and amortization	64	59	76
Loss on retirement/sales of property and equipment	—	—	5
Accretion and amortization on investments, net	(1,534)	(978)	273
Change in fair value of equity investment, including foreign currency translation	196	604	—
Stock-based compensation for services by non-employees	68	191	200
Stock-based compensation for employees and directors	6,079	6,368	8,144
Amortization related to 401(k) contributions	9	9	32
Amortization of right-of use-assets	712	—	—
Changes in assets and liabilities:			
Interest and other receivables	366	(528)	39
Prepaid assets	121	(752)	(56)
Deposit and other assets	(964)	—	—
Accounts payable	199	479	278
Accrued compensation and benefits	2,188	(743)	542
Amount due to Janssen Biotech, Inc.	11,659	908	(1,665)
Accrued liabilities	6,211	391	(508)
Operating lease liabilities	(655)	—	—
Net cash used in operating activities	(43,829)	(21,009)	(20,556)
Cash flows from investing activities:			
Purchases of property and equipment	(413)	(16)	—
Purchases of marketable securities	(153,467)	(188,365)	(100,006)
Proceeds from maturities of marketable securities	181,280	110,663	122,976
Net cash provided by (used in) investing activities	27,400	(77,718)	22,970
Cash flows from financing activities:			
Proceeds from issuances of common stock under equity plans	204	6,951	51
Proceeds from issuances of common stock from financings	19,295	86,017	1,060
Net cash provided by financing activities	19,499	92,968	1,111
Net increase (decrease) in cash, cash equivalents and restricted cash	3,070	(5,759)	3,525
Cash, cash equivalents and restricted cash at the beginning of the period	10,844	16,603	13,078
Cash, cash equivalents and restricted cash at the end of the period	$ 13,914	$ 10,844	$ 16,603

See accompanying notes.

GERON CORPORATION

NOTES TO FINANCIAL STATEMENTS

1. ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Organization

Geron Corporation, or we or Geron, was incorporated in the State of Delaware on November 28, 1990. We are a late-stage clinical biopharmaceutical company that is focused on the development and potential commercialization of imetelstat, an innovative therapeutic for hematologic myeloid malignancies. We have global rights to imetelstat, a first-in-class telomerase inhibitor, which was discovered and developed at Geron. Principal activities to date have included obtaining financing, securing operating facilities and conducting research and development. In November 2014, we entered into an exclusive collaboration and license agreement, or the Collaboration Agreement, with Janssen Biotech, Inc., or Janssen, to develop and commercialize imetelstat worldwide for all indications in oncology, including hematologic myeloid malignancies, and all other human therapeutic uses. Janssen terminated the Collaboration Agreement effective September 28, 2018. Upon the effective date of termination, we regained the global rights to the imetelstat program. Under the termination provisions of the Collaboration Agreement, Janssen provided certain operational support for the imetelstat program during transition of the program to us. As of September 30, 2019, the transition of the imetelstat program to us from Janssen has been completed. See Note 4 on License Agreements for additional information on the former Collaboration Agreement with Janssen.

Prior Period Reclassifications

With the adoption of Accounting Standards Update, or ASU, No. 2016-18, Statement of Cash Flows (Topic 230) Restricted Cash, or ASU No. 2016-18, beginning January 1, 2018, the 2017 presentation of cash and cash equivalents in the statements of cash flows has been updated to conform with current period presentation.

Net Loss Per Share

Basic net income (loss) per share is calculated by dividing net income (loss) by the weighted-average number of shares of common stock outstanding during the periods presented, without consideration for potential common shares. Diluted net income per share would be calculated by adjusting the weighted-average number of shares of common stock outstanding for the dilutive effect of potential common shares outstanding for the periods presented, as determined using the treasury-stock method. Potential dilutive securities consist of outstanding stock options and a warrant to purchase our common stock. Diluted net loss per share excludes potential dilutive securities outstanding for all periods presented as their effect would be anti-dilutive. Accordingly, basic and diluted net loss per share is the same for all periods presented in the accompanying statements of operations. Since we incurred a net loss for 2019, 2018 and 2017, the diluted net loss per share calculation excludes potential dilutive securities of 38,151,906, 27,823,845 and 22,946,422, respectively, related to outstanding stock options and warrants as their effect would have been anti-dilutive.

Use of Estimates

The accompanying financial statements have been prepared in accordance with U.S. generally accepted accounting principles, or GAAP. The preparation of financial statements in conformity with GAAP requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities as of the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. On an ongoing basis, we evaluate our estimates, including those related to accrued liabilities, revenue recognition, fair value of marketable securities and equity investments, operating leases, right-of-use assets, lease liabilities, income taxes, and stock-based compensation. We base our estimates on historical experience and on various other market specific and relevant assumptions that we believe to be reasonable under the circumstances. Actual results could differ from those estimates.

Fair Value of Financial Instruments

Cash Equivalents and Marketable Securities

We consider all highly liquid investments with an original maturity of three months or less to be cash equivalents. We are subject to credit risk related to our cash equivalents and marketable securities. Our marketable debt securities include U.S. government-sponsored enterprise securities, commercial paper and corporate notes.

We classify our marketable debt securities as available-for-sale. We record available-for-sale debt securities at fair value with unrealized gains and losses reported in accumulated other comprehensive income (loss) in stockholders' equity. Realized gains and losses are included in interest and other income and are derived using the specific identification method for determining the cost of securities sold and have been insignificant to date. Dividend and interest income are recognized when earned and included in interest and other income in our statements of operations. We recognize a charge when the declines in the fair values below the amortized cost bases of our available-for-sale securities are judged to be other-than-temporary. We consider various factors in determining whether to recognize an other-than-temporary charge, including whether we intend to sell the security or whether it is more likely than not that we would be required to sell the security before recovery of the amortized cost basis. Declines in market value judged as other-than-temporary result in a charge to interest and other income. We have not recorded any other-than-temporary impairment charges on our available-for-sale securities for the years ended December 31, 2019, 2018 and 2017. See Note 2 on Fair Value Measurements.

Equity Investments

With the adoption of ASU No. 2016-01, *Financial Instruments - Overall: Recognition and Measurement of Financial Assets and Financial Liabilities*, or ASU 2016-01, beginning January 1, 2018, we measure the fair value of our investment in equity securities at each reporting period. Changes in fair value resulting from observable price changes are included in change in fair value of equity investment and changes in fair value resulting from foreign currency translation are included in other expense in our statements of operations.

Leases

At the inception of an arrangement, we determine whether the arrangement is or contains a lease based on the unique facts and circumstances present. Operating leases are included in operating leases, right-of-use assets and lease liabilities in our balance sheets. Right-of-use assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease liabilities and their corresponding right-of-use assets are recorded based on the present value of remaining lease payments over the expected lease term. The present value of remaining lease payments within the 12 months following the balance sheet date are classified as current lease liabilities. The present value of lease payments not within the 12 months following the balance sheet date are classified as noncurrent lease liabilities. The interest rate implicit in lease contracts is typically not readily determinable. As such, to calculate the net present value of lease payments, we apply our incremental borrowing rate, which is the rate incurred to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment as of the lease commencement date. We may adjust the right-of-use assets for certain adjustments, such as initial direct costs paid or incentives received. In addition, we include any options to extend or terminate the lease in the expected lease term when it is reasonably certain that we will exercise any such option. Lease expense is recognized on a straight-line basis over the expected lease term.

For lease agreements entered into after January 1, 2019 that include lease and non-lease components, such components are generally accounted for separately. We have also elected not to recognize on our balance sheets leases with terms of one year or less. See "New Accounting Pronouncements – Recently Adopted" in this Note 1 for additional information on the adoption of the new accounting standard for leases.

Revenue Recognition

Beginning January 1, 2018, we recognize revenue in accordance with the provisions of Accounting Standards Codification Topic 606, *Revenue from Contracts with Customers*, or Topic 606. In determining the appropriate amount and timing of revenue to be recognized under this guidance, we perform the following five steps: (i) identify

the contract(s) with our customer; (ii) identify the promised goods or services in the agreement and determine whether they are performance obligations, including whether they are distinct in the context of the agreement; (iii) measure the transaction price, including the constraint on variable consideration; (iv) allocate the transaction price to the performance obligations based on stand-alone selling prices; and (v) recognize revenue when (or as) we satisfy each performance obligation.

A performance obligation is a promise in an agreement to transfer a distinct good or service to the customer and is the unit of account in Topic 606. Significant management judgment is required to determine the level of effort required and the period over which completion of the performance obligations is expected under an agreement. If reasonable estimates regarding when performance obligations are either complete or substantially complete cannot be made, then revenue recognition is deferred until a reasonable estimate can be made. Revenue is then recognized over the remaining estimated period of performance using the cumulative catch-up method.

We allocate the total transaction price to each performance obligation based on the estimated relative stand-alone selling prices of the promised goods or services underlying each performance obligation. Estimated selling prices for license rights are calculated using an income approach model and include the following key assumptions, judgments and estimates: the development timeline, revenue forecast, commercialization expenses, discount rate and probabilities of technical and regulatory success.

Following is a description of the principal activities from which we generate revenue. License fees and royalty revenue primarily represent amounts earned under agreements that out-license our technology to various companies.

License and/or Collaboration Agreements

We have entered into several license agreements with various oncology, diagnostics, research tools and biologics production companies. Economic terms in these agreements may include non-refundable upfront license payments in cash or equity securities, annual license maintenance fees, cost sharing arrangements, milestone payments, royalties on future sales of products, or any combination of these items. Non-refundable upfront fees, annual license maintenance fees and funding of research and development activities are considered fixed consideration, while milestone payments and royalties are identified as variable consideration.

Licenses of Intellectual Property. If we determine the license to intellectual property is distinct from the other performance obligations identified in the agreement and the licensee can use and benefit from the license, we recognize revenue from non-refundable upfront fees allocated to the license upon the completion of the transfer of the license to the licensee. For such licenses, we recognize revenue from annual license maintenance fees upon the start of the new license period. For licenses that are bundled with other performance obligations, we assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable upfront fees or annual license maintenance fees. At each reporting date, we reassess the progress and, if necessary, adjust the measure of performance and related revenue recognition.

Milestone Payments. At the inception of each agreement that includes milestone payments, we evaluate whether the milestones are considered probable of being achieved and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the value of the associated milestone is included in the transaction price. For milestones that we do not deem to be probable of being achieved, the associated milestone payments are fully constrained and the value of the milestone is excluded from the transaction price with no revenue being recognized. For example, milestone payments that are not within our control, such as regulatory-related accomplishments, are not considered probable of being achieved until those accomplishments have been communicated by the relevant regulatory authority. Once the assessment of probability of achievement becomes probable, we recognize revenue for the milestone payment. At each reporting date, we assess the probability of achievement of each milestone under our current agreements.

Royalties. For agreements with sales-based royalties, including milestone payments based on the level of sales, where the license is deemed to be the predominant item to which the royalties relate, we recognize revenue at the later of (a) when the related sales occur, or (b) when the performance obligation, to which some or all of the royalty has been allocated, has been satisfied (or partially satisfied). At each reporting period, we estimate the sales

incurred by each licensee during the reporting period based on historical experience and accrue the associated royalty amount.

Cost Sharing Arrangements. Research and development and other expenses being shared by both parties under an agreement are recorded as earned or owed based on the performance obligations by both parties under the respective agreement. For arrangements in which we and our collaboration partner in the agreement are exposed to significant risks and rewards that depend on the commercial success of the activity, we recognize payments between the parties on a net basis and record such amounts as a reduction or addition to research and development expense. For arrangements in which we have agreed to perform certain research and development services for our collaboration partner and are not exposed to significant risks and rewards that depend on the commercial success of the activity, we recognize the respective cost reimbursements as revenue under the collaboration agreement over time in a manner proportionate to the costs we incurred to perform the services using the input method.

Restricted Cash

Restricted cash consists of funds maintained in a separate certificate of deposit account for credit card purchases.

Research and Development Expenses

Research and development expenses consist of expenses incurred in identifying, developing and testing product candidates resulting from our independent efforts as well as efforts associated with collaboration agreements. These expenses include, but are not limited to, in-process research and development acquired in an asset acquisition and deemed to have no alternative future use, payroll and personnel expense, lab supplies, non-clinical studies, clinical trials, including support for investigator-sponsored clinical trials, raw materials to manufacture clinical trial drugs, manufacturing costs for research and clinical trial materials, sponsored research at other labs, consulting, costs to maintain technology licenses, our proportionate share of research and development costs under cost sharing arrangements with collaborative partners and research-related overhead. Research and development costs are expensed as incurred, including costs incurred under our collaboration and/or license agreements.

On November 13, 2014, we entered into a Collaboration Agreement with Janssen pursuant to which we granted Janssen the exclusive rights to develop and commercialize imetelstat worldwide for all indications in oncology, including hematologic myeloid malignancies, and all other human therapeutic uses. Janssen terminated the Collaboration Agreement effective September 28, 2018. Under the termination provisions of the Collaboration Agreement, during transition of the program to us, Janssen was required to provide certain operational support for the imetelstat program through September 28, 2019. Operational support from Janssen included clinical development activities, such as continuing monitoring and treatment of patients in ongoing imetelstat clinical trials. We reimbursed Janssen 100% for the costs of such operational support. As of September 30, 2019, the transition of the imetelstat program to us from Janssen has been completed. Transition-related costs, such as transfer of the sponsorship of ongoing imetelstat clinical trials, moving databases and related systems and transmitting regulatory files, were incurred separately by each company, unless otherwise specified in the Collaboration Agreement.

Our current imetelstat clinical trials are being supported by third-party contract research organizations, or CROs, and other vendors. We accrue expenses for clinical trial activities performed by CROs based upon the estimated amount of work completed on each trial. For clinical trial expenses and related expenses associated with the conduct of clinical trials, the significant factors used in estimating accruals include the number of patients enrolled, the number of active clinical sites, and the duration for which the patients have been enrolled in the trial. We monitor patient enrollment levels and related activities to the extent possible through internal reviews, review of contractual terms and correspondence with CROs. We base our estimates on the best information available at the time. For the clinical development activities being conducted by Janssen under the former Collaboration Agreement, we monitored patient enrollment levels and related activities to the extent possible through discussions with Janssen personnel and based our estimates of clinical trial costs on the best information available at the time. However, additional information may become available to us which will allow us to make a more accurate estimate in future periods. In that event, we may be required to record adjustments to research and development expenses in future periods when the actual level of activity becomes more certain.

Depreciation and Amortization

We record property and equipment at cost and calculate depreciation using the straight-line method over the estimated useful lives of the assets, generally four years. Leasehold improvements are amortized over the shorter of the estimated useful life or remaining term of the lease.

Stock-Based Compensation

We maintain various stock incentive plans under which stock options and restricted stock awards are granted to employees, directors and consultants. We also have an employee stock purchase plan for all eligible employees. We recognize stock-based compensation expense based on the grant-date fair values of service-based instruments on a straight-line basis over the requisite service period, which is generally the vesting period. For performance-based stock options with vesting based on the achievement of certain strategic milestones, stock-based compensation expense is recognized over the period from the date the performance condition is determined to be probable of occurring through the date the applicable condition is expected to be met and is reduced for estimated forfeitures, as applicable. If the performance condition is not considered probable of being achieved, no stock-based compensation expense is recognized until such time as the performance condition is considered probable of being met, if at all. If that assessment of the probability of the performance condition being met changes, the impact of the change in estimate would be recognized in the period of the change. The determination of grant-date fair values for our service-based and performance-based stock options and employee stock purchases using the Black Scholes option-pricing model is affected by our stock price as well as assumptions regarding a number of complex and subjective variables. The grant-date fair value for service-based restricted stock awards is determined using the fair value of our common stock on the date of grant.

For our non-employee stock-based awards, the measurement date on which the fair value of the stock-based award is calculated is equal to the earlier of: (i) the date at which a commitment for performance by the counterparty to earn the equity instrument is reached or (ii) the date at which the counterparty's performance is complete. We recognize stock-based compensation expense for the fair value of the vested portion of non-employee stock-based awards in our statements of operations. For additional information, see Note 8 on Stockholders' Equity.

Accumulated Other Comprehensive Loss

Accumulated other comprehensive loss includes certain changes in stockholders' equity which are excluded from net income (loss). Accumulated other comprehensive loss on our balance sheets as of December 31, 2019 and 2018 is solely comprised of net unrealized gains and losses on marketable securities.

Income Taxes

We maintain deferred tax assets and liabilities that reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes and are subject to tests of recoverability. Our deferred tax assets include net operating loss carryforwards, research credits and capitalized research and development. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. Our net deferred tax asset has been fully offset by a valuation allowance because of our history of losses. Any potential accrued interest and penalties related to unrecognized tax benefits would be recorded as income tax expense.

Concentrations of Customers and Suppliers

The majority of our revenues was earned in the United States. Three customers accounted for approximately 79% of our 2019 revenues. Two customers accounted for approximately 59% and 39% of our 2018 and 2017 revenues, respectively.

Segment Information

Our executive management team represents our chief decision maker. We view our operations as a single segment, the development of therapeutic products for oncology. As a result, the financial information disclosed herein materially represents all of the financial information related to our principal operating segment.

Recent Accounting Pronouncements

New Accounting Pronouncements – Recently Adopted

In February 2016, the Financial Accounting Standards Board, or FASB, issued ASU 2016-02, *Leases (Topic 842)*, or ASU 2016-02. ASU 2016-02 requires an entity to recognize a right-of-use asset and lease liability for all lease arrangements with terms of more than 12 months, measured at the present value of the lease payments. Recognition, measurement and presentation of expenses will depend on classification as a finance or operating lease. In July 2018, the FASB issued ASU 2018-11, *Leases (Topic 842): Targeted Improvements*, or ASU 2018-11. In issuing ASU 2018-11, the FASB decided to provide another transition method in addition to the existing transition method by allowing entities to initially apply the new leases standard at the adoption date and recognize a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption.

We adopted Topic 842 on January 1, 2019 using the modified retrospective approach as allowed under ASU 2018-11, and we elected to utilize the available practical expedients. Financial results for the reporting periods beginning after January 1, 2019 are presented under Topic 842, while prior period amounts have not been adjusted and continue to be reported in accordance with our historical accounting under Accounting Standards Codification Topic 840, *Leases*, or Topic 840.

In connection with the adoption of Topic 842 as of January 1, 2019, we recorded an operating lease, right-of-use asset and a corresponding operating lease liability of approximately $736,000 for the net present value of remaining lease payments of our current operating lease for our office space in Menlo Park. The adoption of Topic 842 did not have a material impact on our condensed statements of operations. See Note 7 on Operating Leases for further discussion of our operating lease obligations.

As of January 1, 2019, we also adopted ASU 2018-07 which simplifies the accounting for share-based payments to nonemployees by aligning it with the accounting for share-based payments to employees, with certain exceptions. The new guidance applies to nonemployee awards issued in exchange for goods or services used or consumed in an entity’s own operations. Since all of our share-based awards to nonemployees were fully vested before the adoption of ASU 2018-07, no cumulative-effect adjustment was recognized to the opening balance of retained earnings on January 1, 2019. The adoption of ASU 2018-07 did not have a material impact on our financial statements.

New Accounting Pronouncements – Issued But Not Yet Adopted

In June 2016, the FASB issued ASU 2016-13, *Measurement of Credit Losses on Financial Instruments*, or ASU 2016-13. The main objective of ASU 2016-13 is to provide financial statement users with more decision-useful information about an entity's expected credit losses on financial instruments and other commitments to extend credit at each reporting date. To achieve this objective, the amendments in this update replace the incurred loss impairment methodology currently used today with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to develop credit loss estimates. Subsequent to issuing ASU 2016-13, the FASB issued ASU 2018-19, *Codification Improvements to Topic 326, Financial Instruments – Credit Losses*, or ASU 2018-19, for the purpose of clarifying certain aspects of ASU 2016-13. In May 2019, the FASB issued ASU 2019-05, *Financial Instruments – Credit Losses (Topic 326): Targeted Transition Relief*, or ASU 2019-05, to provide entities with more flexibility in applying the fair value option on adoption of the credit impairment standard. In November 2019, the FASB issued ASU 2019-11, *Codification Improvements to Topic 326, Financial Instruments – Credit Losses*, which expands the scope of the practical expedient that allows entities to exclude the accrued interest component of amortized cost from various disclosure. Entities that elect to apply the practical expedient must disclose the total amount of accrued interest that they exclude from their disclosures of amortized cost. ASU 2018-19, ASU 2019-05 and ASU 2019-11 have the same effective date and transition requirements as ASU 2016-13. ASU 2016-13 will be effective for fiscal years beginning after December 15, 2022, using a modified retrospective approach, for smaller reporting companies. Early adoption is permitted. We plan to adopt ASU 2016-13 and related updates as of January 1, 2023. We do not expect the adoption of this standard to have a material impact on our financial statements.

In August 2018, the FASB issued ASU 2018-13, *Disclosure Framework — Changes to the Disclosure Requirements for Fair Value Measurement,* or ASU 2018-13, which modifies the disclosure requirements on fair value measurements. The new standard is effective for fiscal years beginning after December 15, 2019, and early adoption is permitted. We plan to adopt ASU 2018-13 as of January 1, 2020. We do not expect the adoption of this standard to have a material impact on our financial statements.

In November 2018, the FASB issued ASU 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606*, or ASU 2018-18. The amended guidance precludes presenting consideration from a transaction in a collaborative arrangement as revenue from contracts with customers if the counterparty is not a customer for that transaction. The new guidance is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. Early adoption is permitted. We plan to adopt ASU 2018-18 as of January 1, 2020. We do not expect the adoption of ASU 2018-18 to have a material impact on our financial statements.

2. FAIR VALUE MEASUREMENTS

Cash Equivalents and Marketable Securities

Cash equivalents, restricted cash and marketable securities by security type at December 31, 2019 were as follows:

(In thousands)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Included in cash and cash equivalents:				
Money market funds	$ 6,671	$ —	$ —	$ 6,671
Commercial paper	3,990	—	—	3,990
	$ 10,661	$ —	$ —	$ 10,661
Restricted cash:				
Certificate of deposit	$ 270	$ —	$ —	$ 270
Marketable securities:				
Government-sponsored enterprise securities (due in less than one year)	$ 6,506	$ 6	$ —	$ 6,512
Government-sponsored enterprise securities (due in one to two years)	6,999	1	—	7,000
Commercial paper (due in less than one year)	40,110	33	(3)	40,140
Corporate notes (due in less than one year)	78,926	116	(13)	79,029
Corporate notes (due in one to two years)	12,659	1	(9)	12,651
	$ 145,200	$ 157	$ (25)	$ 145,332

Cash equivalents, restricted cash and marketable securities by security type at December 31, 2018 were as follows:

(In thousands)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Included in cash and cash equivalents:				
Money market funds	$ 7,003	$ —	$ —	$ 7,003
Restricted cash:				
Certificate of deposit	$ 269	$ —	$ —	$ 269
Marketable securities:				
Commercial paper (due in less than one year)	$ 57,594	$ 22	$ (29)	$ 57,587
Corporate notes (due in less than one year)	95,238	7	(118)	95,127
Corporate notes (due in one to two years)	18,647	—	(65)	18,582
	$ 171,479	$ 29	$ (212)	$ 171,296

Cash equivalents and marketable securities with unrealized losses that have been in a continuous unrealized loss position for less than 12 months and 12 months or longer at December 31, 2019 and 2018 were as follows:

	Less Than 12 Months		12 Months or Greater		Total	
(In thousands)	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses
As of December 31, 2019:						
Commercial paper (due in less than one year)	$ 8,571	$ (3)	$ —	$ —	$ 8,571	$ (3)
Corporate notes (due in less than one year)	26,082	(13)	—	—	26,082	(13)
Corporate notes (due in one to two years)	11,624	(9)	—	—	11,624	(9)
	$ 46,277	$ (25)	$ —	$ —	$ 46,277	$ (25)
As of December 31, 2018:						
Commercial paper (due in less than one year)	$ 22,628	$ (29)	$ —	$ —	$ 22,628	$ (29)
Corporate notes (due in less than one year)	66,557	(82)	14,221	(36)	80,778	(118)
Corporate notes (due in one to two years)	18,582	(65)	—	—	18,582	(65)
	$ 107,767	$ (176)	$ 14,221	$ (36)	$ 121,988	$ (212)

The gross unrealized losses related to commercial paper and corporate notes as of December 31, 2019 and 2018 were due to changes in interest rates. We determined that the gross unrealized losses on our cash equivalents and marketable securities as of December 31, 2019 and 2018 were temporary in nature. We review our investments quarterly to identify and evaluate whether any investments have indications of possible impairment. Factors considered in determining whether a loss is temporary include the length of time and extent to which the fair value has been less than the cost basis and whether we intend to sell the security or whether it is more likely than not that we would be required to sell the security before recovery of the amortized cost basis. We currently do not intend to sell these securities before recovery of their amortized cost bases.

Fair Value on a Recurring Basis

We categorize financial instruments recorded at fair value on our balance sheets based upon the level of judgment associated with inputs used to measure their fair value. The categories are as follows:

Level 1 — Inputs are unadjusted, quoted prices in active markets for identical assets or liabilities at the measurement date. An active market for the asset or liability is a market in which transactions for the asset or liability occur with sufficient frequency and volume to provide pricing information on an ongoing basis.

Level 2 — Inputs (other than quoted market prices included in Level 1) are either directly or indirectly observable for the asset or liability through correlation with market data at the measurement date and for the duration of the instrument's anticipated life.

Level 3 — Inputs reflect management's best estimate of what market participants would use in pricing the asset or liability at the measurement date. Consideration is given to the risk inherent in the valuation technique and the risk inherent in the inputs to the model.

A financial instrument's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement. Below is a description of the valuation methodologies used for financial instruments measured at fair value on our balance sheets, including the category for such financial instruments.

Money market funds are categorized as Level 1 within the fair value hierarchy as their fair values are based on quoted prices available in active markets. U.S. government-sponsored enterprise securities, commercial paper, corporate notes and equity investments are categorized as Level 2 within the fair value hierarchy as their fair values

are estimated by using pricing models, quoted prices of securities with similar characteristics or discounted cash flows.

The following table presents information about our financial instruments that are measured at fair value on a recurring basis as of December 31, 2019 and 2018 and indicates the fair value category assigned.

	Fair Value Measurements at Reporting Date Using			
(In thousands)	Quoted Prices in Active Markets for Identical Assets Level 1	Significant Other Observable Inputs Level 2	Significant Unobservable Inputs Level 3	Total
As of December 31, 2019:				
Money market funds[1]	$ 6,671	$ —	$ —	$ 6,671
Government-sponsored enterprise securities[2][3]	—	13,512	—	13,512
Commercial paper[1][2]	—	44,130	—	44,130
Corporate notes[2][3]	—	91,680	—	91,680
Equity investment[4]	—	389	—	389
Total	$ 6,671	$ 149,711	$ —	$ 156,382
As of December 31, 2018:				
Money market funds[1]	$ 7,003	$ —	$ —	$ 7,003
Commercial paper[2]	—	57,587	—	57,587
Corporate notes[2][3]	—	113,709	—	113,709
Equity investment[4]	—	585	—	585
Total	$ 7,003	$ 171,881	$ —	$ 178,884

(1) Included in cash and cash equivalents on our balance sheets.

(2) Included in current portion of marketable securities on our balance sheets.

(3) Included in noncurrent portion of marketable securities on our balance sheets.

(4) Included in deposits and other assets on our balance sheets. See “Equity Investment” in this Note 2 for further discussion of this equity investment.

Equity Investment

In December 2007, we received 13,842,625 ordinary shares in Sienna in connection with a license we granted to them for our human telomerase reverse transcriptase, or hTERT, technology for use in human diagnostics. Upon receipt, the shares were recorded at a zero cost basis under the cost method of accounting. On August 3, 2017, Sienna became a publicly traded company on the Australian Securities Exchange Limited, or ASX, under the ticker symbol SDX. In connection with Sienna’s initial public offering under Australian securities regulations, we signed a 24-month trading restriction from the effective date of Sienna’s listing on the ASX. Due to this trading restriction, under the cost method of accounting, we maintained a zero cost basis for our shares in Sienna as of December 31, 2017. With the adoption of ASU 2016-01 and ASU 2018-03 on January 1, 2018, our equity investment in Sienna must be reported at fair value at each reporting date and any resulting change in fair value is recognized in our statements of operations. As of December 31, 2019, the fair value of our shares in Sienna was $389,000. For the years ended December 31, 2019 and 2018, we recognized a decrease in fair value of equity investment of $195,000 and $541,000, respectively, related to observable price changes. For the years ended December 31, 2019 and 2018, we also recognized losses of $1,000 and $63,000, respectively, related to foreign currency translation, which are included in other expense in our statements of operations.

Credit Risk

We currently place our cash, restricted cash, cash equivalents and marketable securities with four financial institutions in the United States. Generally, these deposits may be redeemed upon demand and therefore, bear minimal risk. Deposits with banks may exceed the amount of insurance provided on such deposits. Financial instruments that potentially subject us to concentrations of credit risk consist primarily of cash equivalents and

marketable securities. Cash equivalents and marketable securities currently consist of money market funds, U.S. government-sponsored enterprise securities, commercial paper and corporate notes. Our investment policy, approved by the audit committee of our board of directors, limits the amount we may invest in any one type of investment issuer, thereby reducing credit risk concentrations.

3. PROPERTY AND EQUIPMENT

Property and equipment, stated at cost, is comprised of the following:

	December 31,	
(In thousands)	2019	2018
Furniture and computer equipment	$ 1,065	$ 727
Leasehold improvements	186	111
	1,251	838
Less accumulated depreciation and amortization	(843)	(779)
	$ 408	$ 59

4. LICENSE AGREEMENTS

Former Collaboration Agreement with Janssen Biotech, Inc.

On November 13, 2014, we and Janssen entered into the Collaboration Agreement under which we granted to Janssen exclusive worldwide rights to develop and commercialize imetelstat for all human therapeutic uses, including hematologic myeloid malignancies. Under the Collaboration Agreement, Janssen initiated two clinical trials of imetelstat: IMbark and IMerge. Under the terms of the Collaboration Agreement, prior to its termination, development costs for IMbark and IMerge were shared between us and Janssen on a 50/50 basis, including costs related to patents licensed to Janssen.

Janssen terminated the Collaboration Agreement effective September 28, 2018. Upon the effective date of termination, we regained the global rights to the imetelstat program and are continuing development of imetelstat on our own. As a result of the termination of the Collaboration Agreement, we will not receive any milestone payments or royalties from Janssen for the development or commercialization of imetelstat, including any clinical development or sales milestones, and Janssen has no obligations to us or any third parties, such as clinical sites or vendors, to fund any potential future imetelstat clinical trials. Since September 28, 2018, our responsibility for imetelstat development costs incurred by Janssen, including continuing support of ongoing clinical trials of imetelstat, increased from 50% to 100%.

On June 14, 2019, we entered into a Clinical Supply Agreement, or Supply Agreement, with Janssen to purchase certain inventories of drug product, drug substance and raw materials for imetelstat manufacturing. Under the Supply Agreement, we will pay Janssen approximately $7,500,000 for drug product upon shipment of the product to our specified drug distribution centers, which was received in full as of December 31, 2019. We also agreed to pay up to approximately $6,700,000 for drug substance and raw materials upon testing to confirm that such materials meet our specifications and delivery by Janssen, and such testing was complete in accordance with our specifications as of December 31, 2019. We expect to pay Janssen for amounts due under the Supply Agreement in the first quarter of 2020 and such amounts have been accrued as of December 31, 2019. All of the amounts under the Clinical Supply Agreement were recorded as research and development expenses in 2019 as the inventories of drug product, drug substance and raw materials are expected to be used for current and potential future clinical trials and have no alternative future use.

As of December 31, 2019, the amount due to Janssen of $14,269,000 on our balance sheet primarily represents the amount owed to Janssen under the Supply Agreement and for remaining operational support of the imetelstat program for the three months ended December 31, 2019.

Janssen Pharmaceuticals, Inc. License Agreement

On September 15, 2016, we entered into the License Agreement with Janssen Pharmaceuticals whereby we granted to Janssen Pharmaceuticals an exclusive worldwide license, or the Exclusive License, under our proprietary patents for the research, development and commercialization of products based on specialized oligonucleotide backbone chemistry and novel amidates for ribonucleic acid interference, or RNAi, for the prevention, treatment and/or diagnosis of any and all human disorders, excluding cancers originating from the blood or bone marrow, and products whose predominant or primary mechanism of action is telomerase inhibition. The License Agreement will remain in effect until the expiration of the last-to-expire patent, unless terminated earlier. Janssen Pharmaceuticals may also terminate the License Agreement at will upon prior written notice to us. In the event of an early termination of the License Agreement, all licenses to Janssen Pharmaceuticals would terminate.

In addition to the Exclusive License, we granted to Janssen Pharmaceuticals a non-exclusive worldwide license, or the Non-Exclusive License, under our patents covering the synthesis of monomers, which are the building blocks of oligonucleotides, and certain know-how necessary for the research, development and commercialization of products under the Exclusive License. We remain responsible for prosecuting the patent rights under the Exclusive License, with reasonable input provided by Janssen Pharmaceuticals, and the costs for such prosecution will be shared between us and Janssen Pharmaceuticals on a 50/50 basis. Under the terms of the License Agreement, we received $5,000,000 from Janssen Pharmaceuticals as a non-refundable upfront payment which we recognized fully as license fee revenue upon the completion of the transfer of the license rights to Janssen Pharmaceuticals since that was the only performance obligation for us. We are also eligible to receive additional potential payments of up to an aggregate maximum total of $75,000,000 for the achievement of certain development and regulatory milestones and tiered royalties in the low single digit percentage range on worldwide net sales of each licensed product commercialized under the License Agreement in any countries where there are valid claims under the patent rights licensed to Janssen Pharmaceuticals.

5. ACCRUED LIABILITIES

Accrued liabilities consisted of the following:

	December 31,	
(In thousands)	2019	2018
CRO and clinical trial costs	$ 5,263	$ 529
Manufacturing activities	1,740	—
Professional legal and accounting fees	318	327
Other	207	461
	$ 7,528	$ 1,317

6. COMMITMENTS AND CONTINGENCIES

Purported Securities Lawsuits

On January 23 and February 14, 2020, putative securities class action lawsuits were commenced in the United States District Court for the Northern District of California, naming as defendants us and one of our officers. On March 5, 2020, a third putative securities class action lawsuit was commenced in the United Stated District Court for the District of New Jersey, naming as defendants us and two of our officers. All three lawsuits allege violations of the Securities Exchange Act of 1934 in connection with allegedly false and misleading statements made by us related to IMbark during the period from March 19, 2018 to September 26, 2018. The plaintiffs allege, among other things, that we failed to disclose facts related to the alleged failure by IMbark to meet the two primary endpoints of the trial, spleen response rate and Total Symptom Score, and that our stock price dropped when such information was disclosed. The plaintiffs seek damages and interest, and an award of reasonable costs, including attorneys' fees. It is possible that additional suits will be filed, or allegations made by stockholders, with respect to these same or other matters and also naming us and/or our officers and directors as defendants. We believe that we have meritorious defenses and intend to vigorously defend against the pending lawsuits.

The pending lawsuits and any other related lawsuits are subject to inherent uncertainties, and the actual defense and disposition costs will depend upon many unknown factors. The outcome of the pending lawsuits and any other related lawsuits is necessarily uncertain. We could be forced to expend significant resources in the defense against the pending lawsuits and any other related lawsuits, and we may not prevail. In addition, we may incur substantial legal fees and costs in connection with such lawsuits. We currently are not able to estimate the possible cost to us from these matters, as the pending lawsuits are currently at an early stage, and we cannot be certain how long it may take to resolve the pending lawsuits or the possible amount of any damages that we may be required to pay. Such amounts could be material to our financial statements if we do not prevail in the defense against the pending lawsuits and any other related lawsuits, or even if we do prevail. We have not established any reserve for any potential liability relating to the pending lawsuits and any other related lawsuits. It is possible that we could, in the future, incur judgments or enter into settlements of claims for monetary damages.

Indemnifications to Officers and Directors

Our corporate bylaws require that we indemnify our directors, as well as those who act as directors and officers of other entities at our request, against expenses, judgments, fines, settlements and other amounts actually and reasonably incurred in connection with any proceedings arising out of their services to Geron. In addition, we have entered into separate indemnification agreements with each of our directors and officers which provide for indemnification of these directors and officers under similar circumstances and under additional circumstances. The indemnification obligations are more fully described in our bylaws and the indemnification agreements. We purchase standard insurance to cover claims or a portion of the claims made against our directors and officers. Since a maximum obligation is not explicitly stated in our bylaws or in our indemnification agreements and will depend on the facts and circumstances that arise out of any future claims, the overall maximum amount of the obligations cannot be reasonably estimated.

Severance Plan

We have an Amended and Restated Severance Plan, or Severance Plan, that applies to all employees that are not subject to performance improvement plans, and provides for, among other benefits: (i) a severance payment upon a Change of Control Triggering Event and Separation from Service and (ii) a severance payment for each non-executive employee upon a Non-Change of Control Triggering Event and Separation from Service. As defined in the Severance Plan, a Change of Control Triggering Event and Separation from Service requires a "double trigger" where: (i) an employee is terminated by us without cause in connection with a change of control or within 12 months following a change of control provided, however, that if an employee is terminated by us in connection with a change of control but immediately accepts employment with our successor or acquirer, the employee will not be eligible for the benefits outlined in the Severance Plan, (ii) an employee resigns because in connection with a change of control, the offered terms of employment (new or continuing) by us or our successor or acquirer within 30 days after the change of control results in a material change in the terms of employment, or (iii) after accepting (or continuing) employment with us after a change of control, an employee resigns within 12 months following a change of control due to a material change in the terms of employment. Under the Severance Plan, a Non-Change of Control Triggering Event and Separation from Service is defined as an event where a non-executive employee is terminated by us without cause. Severance payments range from two to 18 months of base salary, depending on the employee's position with us, payable in a lump sum payment. The Severance Plan also provides that the provisions of employment agreements entered into between us and executive or non-executive employees supersede the provisions of the Severance Plan. As of December 31, 2019, all our executive officers have employment agreements with provisions that may provide greater severance benefits than those in the Severance Plan.

Gain on Settlement

From November 2010 to September 2012, we owned 40% of ViaGen, Inc., or ViaGen, a company with in-house breeding services and expertise in advanced reproductive technologies for animal cloning. In September 2012, we and the other shareholders of ViaGen executed a Share Purchase Agreement, or SPA, and sold our equity interests to Trans Ova Genetics, L.C., or Trans Ova. Under the SPA, we and the other ViaGen shareholders would receive potential payments aggregating up to $6,000,000 upon Trans Ova reaching certain commercial milestones. We and the other ViaGen shareholders were also eligible to receive potential proceeds upon the sale by Trans Ova of a non-marketable equity investment originally held by ViaGen. Payments under the SPA would be shared

amongst the ViaGen shareholders according to their original equity interests in ViaGen prior to the sale to Trans Ova.

In July 2018, we and the other former shareholders of ViaGen filed an arbitration claim against Trans Ova for alleged violations under the SPA, including failure to make payments under certain conditions. In December 2018, we and the other former shareholders of ViaGen agreed to settle the dispute for a one-time payment of $3,650,000, of which we received $1,460,000, which represents our 40% share of the settlement amount. With this settlement, Trans Ova has been released from any further obligations under the SPA, including any future payments.

7. OPERATING LEASES

As described in the subsection entitled, "New Accounting Pronouncements – Recently Adopted", in Note 1 of Notes to Financial Statements of this Form 10-K, we adopted Topic 842 as of January 1, 2019. Prior period amounts have not been adjusted and continue to be reported in accordance with historical accounting under Topic 840.

Menlo Park Office Space Lease

We have an operating lease for our office space at 149 Commonwealth Drive, Menlo Park, California, or the Menlo Park Lease, that was due to expire in January 2020. On September 10, 2019, we amended this lease agreement to extend the lease term by two months to the end of March 2020. The amendment to the Menlo Park Lease is treated as a modification of the existing lease agreement, and the right-of-use asset and corresponding operating lease liability have been remeasured based on the present value of remaining lease payments over the remaining extended lease term, using the discount rate applicable as of the adoption date. Since the operating lease is a net lease, as the non-lease components (i.e., common area maintenance) are paid separately from rent based on actual costs incurred, such non-lease components were not included in the right-of-use asset and liability and are reflected as an expense in the period incurred.

New Jersey Office Space Lease

In April 2019, we entered into an operating lease agreement for office space located at 3 Sylvan Way, Parsippany, New Jersey, or the New Jersey Lease. The initial term of the New Jersey Lease is 11 years with an option to extend for an additional five years and a one-time option to terminate the New Jersey Lease without cause as of the 103rd month anniversary of the commencement date of the lease. The New Jersey Lease commenced on October 1, 2019, upon our control of the office space on that date. Based on the initial term of the New Jersey Lease of 11 years, the right-of-use asset and corresponding operating lease liability was approximately $2,356,000, which represented the present value of lease payments over the initial lease term, using an incremental borrowing rate of 8% based on information available as of October 1, 2019. Under the New Jersey Lease, we are also obligated to pay certain variable expenses separately from the base rent, including electricity and common area maintenance. Such costs will be expensed in the period they are incurred.

As of December 31, 2019, the remaining lease terms for the Menlo Park Lease and New Jersey Lease ranged from 3 months to approximately 10.8 years. The discount rates used to determine the lease liabilities for the Menlo Park Lease and the New Jersey Lease ranged from 5% to 8%.

The components of lease costs included in operating expenses for the Menlo Park Lease and the New Jersey Lease on our statements of operations were as follows:

	Year Ended December 31,		
(In thousands)	2019	2018	2017
Operating lease costs	$ 783	$ 678	$ 661
Variable lease costs (1)	17	31	35
Total lease costs	$ 800	$ 709	$ 696

(1) Variable lease costs represent non-lease components, such as common area maintenance charges.

Foster City Office Space Lease

In October 2019, we entered into an operating lease agreement for office space located at 919 East Hillsdale Boulevard, Foster City, California, or the Foster City Lease. The initial term of the Foster City Lease is 87 months with an option to extend for an additional five years. We have not yet occupied the space as it is being renovated for our use. The Foster City Lease term commences upon the earlier of the date of completion of the construction work or the date upon which we occupy and use the space for its intended purpose. The purpose of the Foster City Lease is to replace our current leased premises at 149 Commonwealth Drive, Menlo Park, California (see above).

Since we do not yet have control of the office space located in Foster City, as defined by Topic 842, during the construction period and do not expect to gain control of the space until on or near the construction completion date, we will not record a right-of-use asset and corresponding lease liability until we occupy the space, which we expect to occur by mid-March 2020, upon which the Foster City Lease will commence. Upon the commencement of the Foster City Lease, the aggregate minimum future lease payments for the initial lease term is approximately $4,400,000, net of a three-month rent abatement period, and subject to scheduled annual increases. Under the Foster City Lease, we are also obligated to pay certain variable expenses separately from the base rent, including taxes and common area maintenance. Such costs will be expensed in the period they are incurred. We have not recognized a right-of-use asset or aggregate lease liability as of December 31, 2019 for the Foster City Lease as the underlying assets were unavailable for use by the Company at any time in the period ended December 31, 2019.

The undiscounted future non-cancellable lease payments under the Menlo Park Lease, the New Jersey Lease and the Foster City Lease as of December 31, 2019 were as follows (in thousands):

2020	$ 713
2021	913
2022	938
2023	962
2024	987
Thereafter	3,762
Total lease payments	8,275
Less: undiscounted lease payments related to Foster City Lease	(4,427)
Less: imputed interest	(1,294)
Total	$ 2,554

8. STOCKHOLDERS' EQUITY

Sales Agreements

On August 28, 2015, we entered into an At Market Issuance Sales Agreement, or the 2015 Sales Agreement, with MLV & Co. LLC, or MLV, under which we could elect to issue and sell shares of our common stock having an aggregate offering price of up to $50,000,000. Pursuant to the 2015 Sales Agreement, common stock was sold at market prices prevailing at the time of sale through MLV as our sales agent. We paid MLV an aggregate commission rate equal to up to 3.0% of the gross proceeds of the sales price per share for common stock sold through MLV under the 2015 Sales Agreement. In December 2017, we sold an aggregate of 614,230 shares of our common stock pursuant to the 2015 Sales Agreement, resulting in net cash proceeds to us of approximately $1,060,000 after deducting sales commissions and offering expenses payable by us. In 2018, we completed the sale of the remaining common stock subject to the 2015 Sales Agreement and issued an aggregate of 13,195,106 shares of our common stock, resulting in net cash proceeds to us of approximately $47,651,000 after deducting sales commissions and offering expenses payable by us. No further shares of common stock may be sold under the 2015 Sales Agreement.

On May 18, 2018, we entered into an At Market Issuance Sales Agreement, or the 2018 Sales Agreement, with B. Riley FBR, Inc., or B. Riley FBR, pursuant to which we may elect to issue and sell shares of our common stock having an aggregate offering price of up to $100,000,000 in such quantities and on such minimum price terms as we set from time to time through B. Riley FBR as our sales agent. We pay B. Riley FBR an aggregate

commission rate equal to up to 3.0% of the gross proceeds of the sales price per share for common stock sold through B. Riley FBR under the 2018 Sales Agreement. In 2019 and 2018, we sold an aggregate of 13,214,867 and 10,083,079 shares of our common stock pursuant to the 2018 Sales Agreement, respectively, resulting in net cash proceeds to us of approximately $19,295,000 and $ 38,366,000, respectively, after deducting sales commissions and offering expenses payable by us. The 2018 Sales Agreement will expire upon the earlier of: (a) the sale of all common stock subject to the 2018 Sales Agreement and (b) May 18, 2021.

Warrant

In connection with each disbursement under a previous loan agreement with the California Institute for Regenerative Medicine, or CIRM, we were obligated to issue to CIRM a warrant to purchase Geron common stock. Such warrants and the underlying common stock were unregistered. We have no further obligations to issue any additional warrants to CIRM. As of December 31, 2019, a warrant to purchase 537,893 shares of our common stock remained outstanding. The warrant was issued to CIRM in August 2011 at an exercise price of $3.98 per share and expires in August 2021.

Equity Plans

2002 Equity Incentive Plan

The 2002 Equity Incentive Plan, or 2002 Plan, expired in May 2012. Upon the adoption of the 2011 Incentive Award Plan in May 2011 (see below), no further grants of options or stock purchase rights were made from the 2002 Plan. Options granted under the 2002 Plan expire no later than ten years from the date of grant. Option exercise prices were equal to 100% of the fair market value of the underlying common stock on the date of grant. Service-based stock options under the 2002 Plan generally vested over a period of four years from the date of the option grant. Other stock awards (restricted stock awards and restricted stock units) had variable vesting schedules which were determined by our board of directors on the date of grant. All outstanding awards granted under the 2002 Plan remain subject to the terms of the 2002 Plan and the individual award agreements thereunder.

2011 Incentive Award Plan

In May 2011, our stockholders approved the adoption of the 2011 Incentive Award Plan, or 2011 Plan. The 2011 Plan provided for grants of either incentive stock options or nonstatutory stock options and stock purchase rights to employees (including officers and employee directors) and consultants (including non-employee directors). Upon the adoption of the 2018 Equity Incentive Plan in May 2018 (see below), no further grants of options or stock purchase rights were made from the 2011 Plan. Options granted under the 2011 Plan expire no later than ten years from the date of grant. Option exercise prices were equal to the fair market value of the underlying common stock on the date of grant.

Service-based stock options under the 2011 Plan generally vested over a period of four years from the date of the option grant. Other stock awards (restricted stock awards and restricted stock units) had variable vesting schedules which were determined by our board of directors on the date of grant. All outstanding awards granted under the 2011 Plan remain subject to the terms of the 2011 Plan and the individual award agreements thereunder.

2018 Equity Incentive Plan

On May 15, 2018, our stockholders approved the adoption of the 2018 Equity Incentive Plan, or 2018 Plan, as the successor to the 2011 Plan. The 2018 Plan provides for the grant of incentive stock options, nonstatutory stock options, stock appreciation rights, restricted stock awards, restricted stock unit awards, other stock awards, and performance awards that may be settled in cash, stock, or other property. Eligible participants under the 2018 Plan include our employees, consultants and directors. The number of shares reserved for issuance under the 2018 Plan (subject to adjustment for certain changes in capitalization) is equal to the sum of (i) the unallocated shares of common stock remaining available for grant under the 2011 Plan as of May 15, 2018, (ii) 10,000,000 newly reserved shares of common stock and (iii) the number of shares subject to awards granted under the 2002 Plan, and the 2011 Plan as such shares become available from time to time, referred to as the Prior Plans' Returning Shares. Such Prior Plans' Returning Shares become available for issuance under the 2018 Plan if outstanding stock awards

granted under the 2002 Plan and the 2011 Plan, after May 15, 2018, expire or terminate for any reason prior to exercise or settlement or are forfeited, cancelled or otherwise returned to us because of the failure to meet a contingency or condition required for the vesting of such shares, or, subject to certain exceptions, are reacquired or withheld (or not issued) by us to satisfy a tax withholding obligation in connection with a stock award.

Options granted under the 2018 Plan expire no later than ten years from the date of grant. Option exercise prices shall be equal to the fair market value of the underlying common stock on the date of grant. If, at the time we grant an option, the optionee directly or by attribution owns stock possessing more than 10% of the total combined voting power of all classes of our stock, the option exercise price shall be at least 110% of the fair market value of the underlying common stock and shall not be exercisable more than five years after the date of grant.

We grant service-based and performance-based stock options to employees under the 2018 Plan. Service-based options generally vest over a period of four years from the date of the option grant. Performance-based options vest upon the achievement of specified milestones. Other stock awards (restricted stock awards and restricted stock units) have variable vesting schedules as determined by our board of directors on the date of grant.

Under certain circumstances, options may be exercised prior to vesting, subject to our right to repurchase the shares underlying such option at the exercise price paid per share. Our repurchase rights would generally terminate on a vesting schedule identical to the vesting schedule of the exercised option. During 2019, we have not repurchased any shares under the 2018 Plan. As of December 31, 2019, we have no shares outstanding subject to repurchase under the 2018 Plan.

As of December 31, 2019, our Non-Employee Director Compensation Policy adopted by our board of directors in March 2014 and amended by our board of directors in February 2015, May 2015, February 2016, January 2018, May 2018, October 2018 and January 2019 provides for the automatic grant to non-employee directors of the following types of equity awards under the 2018 Plan:

First Director Option. Each person who becomes a non-employee director, whether by election by our stockholders or by appointment by our board of directors to fill a vacancy, will automatically be granted an option to purchase 120,000 shares of common stock, or First Director Option, on the date such person first becomes a non-employee director. The First Director Option vests annually over three years upon each anniversary date of appointment to our board of directors.

Subsequent Director Option. Each non-employee director (other than any director receiving a First Director Option on the date of the annual meeting) will automatically be granted a subsequent option to purchase 70,000 shares of common stock, a Subsequent Director Option, on the date of the annual meeting of stockholders in each year during such director's service on our board of directors. The Subsequent Director Option vests in full on the earlier of: (i) the date of the next annual meeting of our stockholders or (ii) the first anniversary of the date of grant.

2006 Directors' Stock Option Plan

The 2006 Directors' Stock Option Plan, or 2006 Directors Plan, was terminated by our board of directors and replaced by the 2011 Plan in March 2014. No further grants of options were made from the 2006 Directors Plan upon the 2006 Directors Plan's termination. All outstanding awards granted under the 2006 Directors Plan remain subject to the terms of the 2006 Directors Plan and the individual award agreements thereunder.

The options granted to non-employee directors under the 2006 Directors Plan were nonstatutory stock options, and they expire no later than ten years from the date of grant. The option exercise price was equal to the fair market value of the underlying common stock on the date of grant. The First Director Option granted to non-employee directors under the 2006 Directors Plan vested annually over three years upon each anniversary date of appointment to the board of directors. The Subsequent Director Option granted to non-employee directors on the date of the annual meeting of stockholders in each year during such director's service on our board of directors under the 2006 Directors Plan vested one year from the date of grant.

2018 Inducement Award Plan

In December 2018, our board of directors approved the adoption of the 2018 Inducement Award Plan, or the Inducement Plan, pursuant to which we reserved 3,000,000 shares of Geron common stock (subject to customary adjustments in the event of a change in capital structure) to be used exclusively for grants of inducement awards to individuals who were not previously Geron employees or directors, other than following a bona fide period of non-employment. In January 2019, our Compensation Committee approved an amendment to increase the reserve of shares of our common stock under the 2018 Inducement Award Plan from 3,000,000 to 8,000,000 shares of common stock and in February 2020, our Compensation Committee approved another amendment to increase the reserve from 8,000,000 to 9,300,000 shares of common stock. The Inducement Plan provides for the grant of nonstatutory stock options, stock appreciation rights, restricted stock awards, restricted stock units and other stock awards, and all awards under the Inducement Plan are intended to meet the standards under Rule 5635(c)(4) of the Nasdaq Listing Rules. The terms and conditions of the Inducement Plan and the inducement awards to be granted thereunder are substantially similar to the 2018 Plan.

Directors' Market Value Stock Purchase Plan

In October 2018, our board of directors adopted a Directors' Market Value Stock Purchase Plan, or the Directors Market Plan. A total of 1,000,000 shares of Geron common stock has been reserved for the Directors Market Plan. Under the Directors Market Plan, non-employee directors may purchase shares of Geron common stock at the prevailing market price on the purchase date with cash compensation payable to them for their services as a board member. As stated in Geron's Non-Employee Director Compensation Policy, each non-employee director receives annual cash compensation, payable quarterly in arrears, for their services on the board and various committees of the board. As provided in the Non-Employee Director Compensation Policy, a non-employee director may elect to receive fully vested shares of common stock in lieu of cash and such shares shall be issuable from the Directors Market Plan.

Prior to the adoption of the Directors Market Plan, we issued fully vested restricted stock awards to those non-employee directors who elected to receive common stock in lieu of cash for their services on the board and various committees. In 2019, we issued 29,150 shares of common stock from the Directors Market Plan. In 2018, we issued 73,980 shares of common stock from the 2018 Plan. In 2017, we issued 72,066 shares of common stock from the 2011 Plan. The weighted average grant date fair value of restricted stock granted during the years ended December 31, 2019, 2018 and 2017 was $1.50, $1.91 and $2.20 per share, respectively. The total fair value of restricted stock that vested during 2019, 2018 and 2017 was $44,000, $141,000 and $159,000, respectively.

Aggregate option and award activity for the 2002 Plan, 2011 Plan, 2018 Plan, 2006 Directors Plan, Inducement Plan and Directors Market Plan is as follows:

		Outstanding Options			
	Shares Available For Grant	Number of Shares	Weighted Average Exercise Price Per Share	Weighted Average Remaining Contractual Life (In years)	Aggregate Intrinsic Value (In thousands)
Balance at December 31, 2018	11,964,399	27,285,952	$ 2.72		
Additional shares authorized	5,000,000	—	$ —		
Options granted	(11,735,600)	11,735,600 (1)	$ 1.32		
Awards granted	(29,150)	—	$ —		
Options exercised	—	(137,333)	$ 1.19		
Options cancelled/forfeited/ expired	1,207,706	(1,270,206)	$ 3.50		
Balance at December 31, 2019	6,407,355 (2)	37,614,013 (3)	$ 2.26	6.83	$ 1,800
Options exercisable at December 31, 2019		19,915,713	$ 2.86	4.95	$ 359
Options fully vested and expected to vest at December 31, 2019		36,293,713	$ 2.29	6.75	$ 1,698

(1) Includes 1,000,000 performance-based stock options granted in 2019 that have not achieved certain strategic milestones.

(2) In February 2020, our Compensation Committee approved an amendment to increase the reserve for the 2018 Inducement Plan from 8,000,000 to 9,300,000 shares of common stock.

(3) Includes 1,000,000 and 4,500,000 performance-based stock options granted in 2019 and 2018, respectively, that have not achieved certain strategic milestones.

The aggregate intrinsic value in the preceding table represents the total intrinsic value, based on Geron's closing stock price of $1.36 per share as of December 31, 2019, which would have been received by the option holders had all the option holders exercised their options as of that date.

We have not granted any options with an exercise price below or greater than the fair market value of our common stock on the date of grant in 2019, 2018 or 2017. As of December 31, 2019, 2018 and 2017, there were 19,915,713, 16,464,746 and 17,249,032 exercisable options outstanding at weighted average exercise prices per share of $2.86, $3.13 and $3.03, respectively.

The total pretax intrinsic value of stock options exercised during 2019, 2018 and 2017 was $80,000, $8,812,000 and $15,000, respectively. Cash received from the exercise of options in 2019, 2018 and 2017 totaled approximately $163,000, $6,929,000 and $18,000, respectively.

Information about stock options outstanding as of December 31, 2019 is as follows:

	Options Outstanding		
Exercise Price Range	Number of Shares	Weighted Average Exercise Price Per Share	Weighted Average Remaining Contractual Life (In years)
$1.03 - $1.48	9,578,200	$ 1.19	8.26
$1.50 - $1.74	10,928,400	$ 1.67	7.17
$1.77 - $2.54	9,732,417	$ 2.27	6.86
$2.63 - $5.29	7,374,996	$ 4.54	4.43
$1.03 - $5.29	37,614,013 (1)	$ 2.26	6.83

(1) Includes 1,000,000 and 4,500,000 performance-based stock options granted in 2019 and 2018, respectively, that have not achieved certain strategic milestones.

Employee Stock Purchase Plan

In March 2014, our board of directors adopted the 2014 Employee Stock Purchase Plan, or 2014 Purchase Plan. The 2014 Purchase Plan was approved by our stockholders in May 2014. The 2014 Purchase Plan replaced the 1996 Employee Stock Purchase Plan, or 1996 Purchase Plan, which was terminated effective as of the date the 2014 Purchase Plan was approved by our stockholders. Under the 2014 Purchase Plan, we are authorized to sell to eligible employees up to an aggregate of 1,000,000 shares of Geron common stock. As of December 31, 2019, an aggregate of 163,641 shares of our common stock have been issued under the 2014 Purchase Plan since its adoption.

The 2014 Purchase Plan is comprised of a series of offering periods, each with a maximum duration (not to exceed 12 months) with new offering periods commencing on January 1st and July 1st of each year. The date an employee enters the offering period will be designated as the entry date for purposes of that offering period. An employee may participate only in one offering period at a time. Each offering period consists of two consecutive purchase periods of six months' duration, with the last day of such period designated a purchase date.

Under the terms of the 2014 Purchase Plan, employees can choose to have up to 10% of their annual salary withheld to purchase our common stock. An employee may not make additional payments into such account or increase the withholding percentage during the offering period.

The purchase price per share at which common stock is purchased by the employee on each purchase date within the offering period is equal to 85% of the lower of (i) the fair market value per share of Geron common stock on the employee's entry date into that offering period or (ii) the fair market value per share of Geron common stock on the purchase date. If the fair market value per share of Geron common stock on the purchase date is less than the fair market value at the beginning of the offering period, a new 12 month offering period will automatically begin on the first business day following the purchase date with a new fair market value.

Stock-Based Compensation for Employees and Directors

We measure and recognize compensation expense for all share-based payment awards made to employees and directors, including employee stock options, restricted stock awards and employee stock purchases, based on grant-date fair values for these instruments. We use the Black Scholes option-pricing model to estimate the grant-date fair value of our service-based and performance-based stock options and employee stock purchases. The fair value for service-based restricted stock awards is determined using the fair value of our common stock on the date of grant.

As stock-based compensation expense recognized in the statements of operations for the years ended December 31, 2019, 2018 and 2017 is based on awards ultimately expected to vest, it has been reduced for estimated forfeitures, but at a minimum, reflects the grant-date fair value of those awards that actually vested in the period. Forfeitures have been estimated at the time of grant based on historical data and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. With the adoption of Accounting Standards Update No. 2016-09, *Improvements to Employee Share Based Payment Accounting*, or ASU 2016-09, in the first quarter of 2017, we elected to continue to estimate forfeitures expected to occur to determine the amount of stock-based compensation expense to be recognized in each period. The adoption of ASU 2016-09 did not impact our accounting for or presentation of excess tax benefits recognized on stock-based compensation expense on our financial statements since our net deferred tax assets are fully offset by a valuation allowance due to our history of operating losses. In addition, presentation requirements for cash flows related to employee taxes paid for withheld shares had no impact to all periods presented.

In 2019 and 2018, our board of directors awarded performance-based stock options to certain employees. These performance-based stock options are included in the outstanding options table above. Performance-based options vest only upon achievement of discrete strategic milestones. Stock-based compensation expense for performance-based options is recognized over the period from the date the performance condition is determined to be probable of occurring through the date the applicable condition is expected to be met and is reduced for estimated forfeitures, as applicable. If the performance condition is not considered probable of being achieved, no stock-based

compensation expense is recognized until such time as the performance condition is considered probable of being met, if ever.

We recognize stock-based compensation expense for service-based stock options on a straight-line basis over the requisite service period, which is generally the vesting period. We have not recognized any stock-based compensation expense for performance-based stock options in our statements of operations for the years ended December 31, 2019 and 2018, as the achievement of the specified strategic milestones was not considered probable during that time. The following table summarizes the stock-based compensation expense related to service-based stock options, restricted stock awards and employee stock purchases for the years ended December 31, 2019, 2018 and 2017 which was allocated as follows:

	Year Ended December 31,		
(In thousands)	2019	2018	2017
Research and development	$ 1,640	$ 949	$ 988
General and administrative	4,439	5,419	7,156
Stock-based compensation expense included in operating expenses	$ 6,079	$ 6,368	$ 8,144

The fair value of stock options granted in 2019, 2018 and 2017 has been estimated at the date of grant using the Black Scholes option-pricing model with the following assumptions:

	Year Ended December 31,		
	2019	2018	2017
Dividend yield	0%	0%	0%
Expected volatility range	0.792 to 0.980	0.821 to 0.990	0.884 to 0.892
Risk-free interest rate range	1.50% to 2.56%	2.55% to 3.11%	1.98% to 1.99%
Expected term range	5.25 - 6.44 yrs	5.25 - 6.62 yrs	5.5 yrs

The fair value of employee stock purchases in 2019, 2018 and 2017 has been estimated using the Black Scholes option-pricing model with the following assumptions:

	Year Ended December 31,		
	2019	2018	2017
Dividend yield	0%	0%	0%
Expected volatility range	0.646 to 1.653	0.437 to 0.475	0.577 to 0.641
Risk-free interest rate range	1.94% to 2.63%	1.53% to 1.76%	0.45% to 0.89%
Expected term range	6 - 12 mos	6 - 12 mos	6 - 12 mos

Dividend yield is based on historical cash dividend payments and Geron has paid no cash dividends to date. The expected volatility range is based on historical volatilities of our stock since traded options on Geron common stock do not correspond to option terms and the trading volume of options is limited. The risk-free interest rate range is based on the U.S. Zero Coupon Treasury Strip Yields for the expected term in effect on the date of grant for an award. The expected term of options is derived from actual historical exercise and post-vesting cancellation data and represents the period of time that options granted are expected to be outstanding. The expected term of employees' purchase rights is equal to the purchase period.

Based on the Black Scholes option-pricing model, the weighted average estimated fair value of stock options granted during the years ended December 31, 2019, 2018 and 2017 was $0.94, $1.52 and $1.58 per share, respectively. The weighted average estimated fair value of employees' purchase rights for the years ended December 31, 2019, 2018 and 2017 was $0.66, $0.56 and $0.75 per share, respectively. As of December 31, 2019, total compensation cost related to unvested share-based payment awards not yet recognized, net of estimated forfeitures and assuming no probability of achievement for outstanding performance-based stock options, was $11,928,000, which is expected to be recognized over the next 32 months on a weighted-average basis.

401(k) Plan Matching Contributions

We sponsor a defined-contribution savings plan under Section 401(k) of the Internal Revenue Code covering all full-time U.S. employees, or the Geron 401K Plan. Participating employees may contribute up to the annual Internal Revenue Service contribution limit. The Geron 401K Plan also permits us to provide discretionary matching and profit sharing contributions.

Stock-Based Compensation to Service Providers

We grant stock options and restricted stock awards to consultants from time to time in exchange for services performed for us. In general, the stock options and restricted stock awards vest over the contractual period of the consulting arrangement. The fair value of stock options and restricted stock awards held by consultants is recorded as operating expenses over the vesting term of the respective equity awards. With the adoption of Accounting Standards Update 2018-07, *Improvements to Nonemployee Share-Based Payment Accounting*, or ASU 2018-07, in the first quarter of 2019, the measurement date of stock options granted to consultants was fixed at the grant date. We recorded stock-based compensation expense of $24,000, $50,000 and $41,000 for the vested portion of the fair value of stock options and restricted stock awards held by consultants in 2019, 2018 and 2017, respectively.

Common Stock Reserved for Future Issuance

Common stock reserved for future issuance as of December 31, 2019 is as follows:

Outstanding stock options	37,614,013
Options and awards available for grant	6,407,355
Employee stock purchase plan	836,359
Warrant outstanding	537,893
Total	45,395,620

9. INCOME TAXES

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of our deferred tax assets are as follows:

	December 31,	
	2019	2018
	(In thousands)	
Net operating loss carryforwards	$ 204,600	$ 192,100
Research credits	38,400	35,500
Capitalized research and development	5,900	2,500
Stock-based compensation	7,700	6,400
Operating lease liabilities	700	—
Other	1,200	600
Total deferred tax assets	258,500	237,100
Less: valuation allowance	(257,900)	(237,100)
Net deferred tax assets	600	—
Operating leases, right-of-use assets	(600)	—
Total deferred tax liabilities	(600)	—
Total net deferred tax assets	$ —	$ —

We record net deferred tax assets to the extent we believe these assets will more likely than not be realized. In making such determination, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax planning strategies and recent financial performance. Forming a conclusion that a valuation allowance is not required is difficult when there is negative evidence such as cumulative losses in recent years. Because of our history of losses, the net deferred tax assets have been fully offset by a valuation allowance. The valuation allowance increased by $20,800,000 and $4,300,000 for the years ended December 31, 2019 and 2018, respectively, and decreased by $89,400,000 during the year ended December 31, 2017. No income tax benefit was realized from stock options exercised in 2019 because our net deferred tax assets have been fully offset by a valuation allowance.

As of December 31, 2019, we had domestic federal net operating loss carryforwards of approximately $859,200,000. Of this, $769,500,000 will expire at various dates beginning in 2020 through 2037 and the remaining will carryforward indefinitely under the new tax laws, but is subject to an 80% taxable income limitation. As of December 31, 2019, we had state net operating loss carryforwards of approximately $346,500,000 expiring at various dates beginning in 2028 through 2039, if not utilized. We also had federal research and development tax credit carryforwards of approximately $39,400,000 expiring at various dates beginning in 2020 through 2039, if not utilized. Our state research and development tax credit carryforwards of approximately $19,600,000 carry forward indefinitely.

Due to the change of ownership provisions of the Tax Reform Act of 1986, utilization of a portion of our domestic net operating loss and tax credit carryforwards may be limited in future periods. Further, a portion of the carryforwards may expire before being applied to reduce future income tax liabilities.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017, or 2017 Tax Act, was signed into law. Among other things, the 2017 Tax Act permanently lowers the corporate federal income tax rate to 21% from the previous maximum rate of 35%, effective for tax years including or commencing January 1, 2018. In accordance with GAAP, we remeasured the carrying value of our deferred tax assets as of December 31, 2017 using the new enacted corporate federal income tax rate of 21%. This remeasurement reduced our aggregate net deferred tax assets and correspondingly reduced the valuation allowance by approximately $102,300,000 in 2017. The remeasurement did not impact our financial statements.

In accordance with Staff Accounting Bulletin 118, as of December 31, 2017, we made a reasonable estimate of the effects of the 2017 Tax Act on our existing deferred tax assets. Our preliminary estimate and the remeasurement of our deferred tax assets was subject to further analysis related to certain matters, such as developing interpretations of the provisions of the 2017 Tax Act, changes to certain estimates and the filing of our tax returns. U.S. Treasury regulations, administrative interpretations or court decisions interpreting the 2017 Tax Act may require further adjustments and changes in our estimates. In the fourth quarter of 2018, we completed our analysis to determine the effect of the 2017 Tax Act. No material adjustments were noted from the completion of the analysis as of December 31, 2018.

We adopted the provision of the standard for accounting for uncertainties in income taxes on January 1, 2007. Upon adoption, we recognized no material adjustment in the liability for unrecognized tax benefits. At December 31, 2019, we had approximately $17,700,000 of unrecognized tax benefits, none of which would currently affect our effective tax rate if recognized due to our net deferred tax assets being fully offset by a valuation allowance.

A reconciliation of the beginning and ending amounts of unrecognized tax benefits is as follows (in thousands):

Balance as of December 31, 2018	$ 16,400
Decrease related to prior year tax positions	(40)
Increase related to current year tax positions	1,340
Balance as of December 31, 2019	$ 17,700

If applicable, we would classify interest and penalties related to uncertain tax positions in income tax expense. Through December 31, 2019, there has been no interest expense or penalties related to unrecognized tax benefits.

We do not currently expect any significant changes to unrecognized tax benefits during the fiscal year ended December 31, 2020. In certain cases, our uncertain tax positions are related to tax years that remain subject to examination by the relevant tax authorities. Tax years for which we have carryforward net operating loss and credit attributes remain subject to examination by federal and most state tax authorities.

10. STATEMENTS OF CASH FLOWS DATA

	Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Supplemental investing activities:			
Net unrealized gain (loss) on marketable securities	$ 315	$ 24	$ (154)
Operating lease assets obtained in exchange for operating lease liabilities	2,473	—	—

We have not made any cash payments for taxes or interest for the years ended December 31, 2019, 2018 and 2017.

11. SELECTED QUARTERLY FINANCIAL INFORMATION (UNAUDITED)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share amounts)			
Year Ended December 31, 2019:				
Revenues	$ 57	$ 101	$ 131	$ 171
Operating expenses	11,358	15,325	16,103	30,179
Net loss	(10,059)	(14,239)	(15,180)	(29,070)
Basic and diluted net loss per share	$ (0.05)	$ (0.08)	$ (0.08)	$ (0.15)
Year Ended December 31, 2018:				
Revenues	$ 318	$ 208	$ 165	$ 375
Operating expenses	7,755	7,450	6,970	9,964
Net loss	(7,186)	(6,934)	(5,597)	(7,300)
Basic and diluted net loss per share	$ (0.04)	$ (0.04)	$ (0.03)	$ (0.04)

Basic and diluted net loss per share are computed independently for each of the quarters presented. Therefore, the sum of the quarters may not be equal to the full year net loss per share amounts.

12. SUBSEQUENT EVENT

At Market Issuance Sales Agreement

In January 2020, we sold an aggregate of 530,228 shares of our common stock pursuant to the 2018 Sales Agreement, resulting in net cash proceeds to us of approximately $748,000 after deducting sales commissions and estimated offering expenses payable by us. For further discussion of the 2018 Sales Agreement, see Note 8 on Stockholders' Equity.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

(I) Evaluation of Disclosure Controls and Procedures

We have carried out an evaluation under the supervision and with the participation of management, including our Chief Executive Officer and our Chief Financial Officer, of our disclosure controls and procedures (as defined in Rule 13a-15(e) of the Securities Exchange Act of 1934, as amended) as of the end of the period covered by this annual report on Form 10-K. Based on that evaluation, our Chief Executive Officer and our Chief Financial Officer concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of December 31, 2019.

In designing and evaluating disclosure controls and procedures, our management recognizes that any system of controls, however well designed and operated, can provide only reasonable assurance, and not absolute assurance, that the desired control objectives of the system are met. In addition, the design of any control system is based in part upon certain assumptions about the likelihood of future events. Because of these and other inherent limitations of control systems, there can be no assurance that any design will succeed in achieving its stated goals in all future circumstances. Accordingly, our disclosure controls and procedures are designed to provide reasonable, not absolute, assurance that the objectives of our disclosure control system are met and, as set forth above, our Chief Executive Officer and our Chief Financial Officer have concluded, based on their evaluation as of the end of the period covered by this annual report on Form 10-K, that our disclosure controls and procedures were effective to provide reasonable assurance that the objectives of our disclosure control system were met.

(II) Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

(III) Management's Report on Internal Control over Financial Reporting

Internal control over financial reporting refers to the process designed by, or under the supervision of, our Chief Executive Officer and Chief Financial Officer, and effected by our board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles, and includes those policies and procedures that:

(1) Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of our assets;

(2) Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and

(3) Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

Management is responsible for establishing and maintaining an adequate internal control over financial reporting for us. Internal control over financial reporting cannot provide absolute assurance of achieving financial reporting objectives because of its inherent limitations. Internal control over financial reporting is a process that involves human diligence and compliance and is subject to lapses in judgment and breakdowns resulting from human failures. Internal control over financial reporting also can be circumvented by collusion or improper management override. Because of such limitations, there is a risk that material misstatements may not be prevented or detected on a timely basis by internal control over financial reporting. However, these inherent limitations are known features of the financial reporting process. Therefore, it is possible to design into the process safeguards to reduce, though not eliminate, this risk.

Under the supervision and with the participation of our management, including our Chief Executive Officer and our Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework set forth in "Internal Control—Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on our evaluation under the framework set forth in "Internal Control—Integrated Framework," our management concluded that our internal control over financial reporting was effective as of December 31, 2019. The effectiveness of our internal control over financial reporting as of December 31, 2019 has been audited by Ernst & Young LLP, an independent registered public accounting firm, as stated in their report which is included herein.

(IV) Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Geron Corporation

Opinion on Internal Control over Financial Reporting

We have audited Geron Corporation's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Geron Corporation (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the balance sheets of the Company as of December 31, 2019 and 2018, the related statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and our report dated March 12, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Redwood City, California
March 12, 2020

ITEM 9B. OTHER INFORMATION

None.

PART III

Certain information required by Part III is omitted from this annual report on Form 10-K because we will file with the U.S. Securities and Exchange Commission a definitive proxy statement pursuant to Regulation 14A in connection with the solicitation of proxies for Geron's Annual Meeting of Stockholders expected to be held in June 2020, or the Proxy Statement, not later than 120 days after the end of the fiscal year covered by this annual report on Form 10-K, and certain information included therein is incorporated herein by reference.

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Identification of Directors and Nominees for Director

The information required by this item concerning our directors and nominees for director is incorporated by reference from the section captioned "Proposal 1: Election of Directors" contained in our Proxy Statement.

Identification of Executive Officers

The information required by this item concerning our executive officers is set forth in Part I, Item 1 of this annual report on Form 10-K.

Code of Ethics

We have adopted a Code of Conduct with which every person who works for Geron, including our board of directors, is expected to comply. The Code of Conduct is publicly available on our website under the Investor Relations section at www.geron.com. This website address is intended to be an inactive, textual reference only; none of the material on this website is part of this annual report on Form 10-K. If any substantive amendments are made to the Code of Conduct or any waiver granted, including any implicit waiver, from a provision of the Code to our Chief Executive Officer, Chief Financial Officer or Corporate Controller, we will disclose the nature of such amendment or waiver on that website or in a report on Form 8-K.

Copies of the Code of Conduct will be furnished without charge to any person who submits a written request directed to the attention of our Corporate Secretary, at our offices located at 149 Commonwealth Drive, Suite 2070, Menlo Park, California, 94025.

Certain Corporate Governance Matters

The information required by this item concerning our audit committee, audit committee financial expert and procedures by which stockholders may recommend nominees to our board of directors, may be found under the sections captioned "Board Leadership and Governance" and "Other Matters" contained in the Proxy Statement.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated by reference from the sections captioned "Compensation Discussion and Analysis," "Compensation Committee Report," "Executive Compensation Tables and Related Narrative Disclosure," "Compensation of Directors" and "Compensation Committee Interlocks and Insider Participation" contained in the Proxy Statement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item is incorporated by reference from the sections captioned "Equity Compensation Plan Information" and "Security Ownership of Certain Beneficial Owners and Management" contained in the Proxy Statement.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated by reference from the sections captioned "Proposal 1: Election of Directors" and "Certain Transactions" contained in the Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item is incorporated by reference from the section captioned "Principal Accountant Fees and Services" contained in the Proxy Statement.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) (1) Financial Statements

Included in Part II, Item 8 of this Report:

(2) Financial Statement Schedules

Financial statement schedules are omitted because they are not required or the information is disclosed in the financial statements listed in Item 15(a)(1) above.

(3) Exhibits

		Incorporation by Reference			
Exhibit Number	**Description**	**Exhibit Number**	**Filing**	**Filing Date**	**File No.**
2.1	Asset Contribution Agreement by and among Geron Corporation, BioTime, Inc. and Asterias Biotherapeutics, Inc. (formerly known as BioTime Acquisition Corporation)	2.1	8-K	January 8, 2013	000-20859
3.1	Restated Certificate of Incorporation	3.3	8-K	May 18, 2012	000-20859
3.2	Certificate of Amendment of the Restated Certificate of Incorporation	3.1	8-K	May 18, 2012	000-20859
3.3	Certificate of Amendment of the Restated Certificate of Incorporation	3.1	8-K	June 7, 2019	000-20859
3.4	Amended and Restated Bylaws of Registrant	3.1	8-K	March 19, 2010	000-20859
3.5	Amendment to Amended and Restated Bylaws of Registrant	3.4	8-K	November 22, 2017	000-20859
4.1	Description of Capital Stock				
4.2	Form of Common Stock Certificate	4.1	10-K	March 15, 2013	000-20859
4.3	Form of 2011 Warrant	Attachment to 10.1	10-Q	November 3, 2011	000-20859
10.1	Form of Indemnification Agreement	10.1	10-K	March 7, 2012	000-20859
10.2	Amended and Restated 2002 Equity Incentive Plan*	4.1	S-8	June 4, 2010	333-167349
10.3	Form of Stock Option Agreement under 2002 Equity Incentive Plan*	10.6	10-K	March 15, 2013	000-20859
10.4	Amended and Restated 2006 Directors' Stock Option Plan*	10.5	10-Q	November 7, 2013	000-20859
10.5	2011 Incentive Award Plan*	10.1	8-K	May 16, 2011	000-20859
10.6	Form of Stock Option Agreement under 2011 Incentive Award Plan*	10.11	10-K	March 15, 2013	000-20859
10.7	Form of Restricted Stock Award Agreement under 2011 Incentive Award Plan*	10.12	10-K	March 15, 2013	000-20859
10.8	Form of Non-Employee Director Stock Option Agreement under 2011 Incentive Award Plan*	10.2	10-Q	May 7, 2015	000-20859
10.9	2018 Equity Incentive Plan*	10.2	8-K	May 18, 2018	000-20859
10.10	Form of Employee Stock Option Agreement under 2018 Equity Incentive Plan*	10.3	8-K	May 18, 2018	000-20859
10.11	Form of Employee Stock Option Agreement under 2018 Equity Incentive Plan, as amended*	10.11	10-K	March 7, 2019	000-20859
10.12	Form of Non-Employee Director Stock Option Agreement under 2018 Equity Incentive Plan*	10.4	8-K	May 18, 2018	000-20859
10.13	Form of Non-Employee Director Stock Option Agreement under 2018 Equity Incentive Plan, as amended*	10.13	10-K	March 7, 2019	000-20859
10.14	Form of Performance-Vesting Stock Option Agreement under 2018 Equity Incentive Plan*	10.14	10-K	March 7, 2019	000-20859
10.15	Form of Performance-Vesting Stock Option Agreement under 2018 Equity Incentive Plan, as amended*	10.15	10-K	March 7, 2019	000-20859
10.16	2018 Inducement Award Plan*	10.1	8-K	December 14, 2018	000-20859
10.17	2018 Inducement Award Plan, as amended January 29, 2019*	10.17	10-K	March 7, 2019	000-20859

		Incorporation by Reference			
Exhibit Number	Description	Exhibit Number	Filing	Filing Date	File No.
10.18	2018 Inducement Award Plan, as amended February 11, 2020*				
10.19	Form of Stock Option Agreement under 2018 Inducement Award Plan*	10.2	8-K	December 14, 2018	000-20859
10.20	Form of Stock Option Agreement under 2018 Inducement Award Plan, as amended*	10.19	10-K	March 7, 2019	000-20859
10.21	Form of Performance-Vesting Stock Option Agreement under 2018 Inducement Award Plan*	10.20	10-K	March 7, 2019	000-20859
10.22	2014 Employee Stock Purchase Plan*	10.1	8-K	May 23, 2014	000-20859
10.23	Non-Employee Director Compensation Policy, as amended January 30, 2019*	10.26	10-K	March 7, 2019	000-20859
10.24	Non-Employee Director Compensation Policy, as amended February 12, 2020*				
10.25	Directors' Market Value Stock Purchase Plan, effective October 1, 2018*	10.1	10-Q	November 1, 2018	000-20859
10.26	Amended and Restated Severance Plan, effective as of January 30, 2019*	10.28	10-K	March 7, 2019	000-20859
10.27	Amended and Restated Employment agreement between the Registrant and John A. Scarlett, M.D., effective as of January 31, 2019*	10.29	10-K	March 7, 2019	000-20859
10.28	Amended and Restated Employment agreement between the Registrant and Stephen N. Rosenfield, effective as of January 31, 2019*	10.30	10-K	March 7, 2019	000-20859
10.29	Amended and Restated Employment agreement between the Registrant and Andrew J. Grethlein, effective as of January 31, 2019*	10.31	10-K	March 7, 2019	000-20859
10.30	Amended and Restated Employment agreement between the Registrant and Olivia K. Bloom, effective as of January 31, 2019*	10.32	10-K	March 7, 2019	000-20859
10.31	Amended and Restated Employment agreement between the Registrant and Melissa A. Kelly Behrs, effective as of January 31, 2019*	10.33	10-K	March 7, 2019	000-20859
10.32	Employment Agreement between the Registrant and Aleksandra K. Rizo, effective as of January 15, 2019*	10.34	10-K	March 7, 2019	000-20859
10.33	Employment Agreement between the Registrant and Anil Kapur, effective as of December 2, 2019*				
10.34†	California Institute for Regenerative Medicine Notice of Loan Award	10.1	10-Q	November 3, 2011	000-20859
10.35	Sixth Amendment to Office Lease Agreement by and between the Registrant and Exponent Realty, LLC, effective as of September 21, 2017	10.1	8-K	September 22, 2017	000-20859
10.36	Seventh Amendment to Lease Agreement by and between Registrant and Exponent Realty, LLC, effective as of September 10, 2019	10.1	10-Q	November 6, 2019	000-20859
10.37	Office Lease Agreement by and between Registrant and 3 Sylvan Realty LLC, effective as of April 30, 2019	10.18	10-Q	May 2, 2019	000-20859
10.38	Office Lease Agreement by and between Registrant and Hudson Metro Center LLC, effective as of October 9, 2019	10.1	8-K	October 15, 2019	000-20859

		Incorporation by Reference			
Exhibit Number	Description	Exhibit Number	Filing	Filing Date	File No.
10.39	At Market Issuance Sales Agreement, dated May 18, 2018, by and between Registrant and B. Riley FBR, Inc.	10.1	8-K	May 18, 2018	000-20859
23.1	Consent of Independent Registered Public Accounting Firm				
24.1	Power of Attorney (see signature page)				
31.1	Certification of Chief Executive Officer pursuant to Form of Rule 13a-14(a), as Adopted Pursuant to Section 302(a) of the Sarbanes-Oxley Act of 2002, dated March 12, 2020				
31.2	Certification of Chief Financial Officer pursuant to Form of Rule 13a-14(a), as Adopted Pursuant to Section 302(a) of the Sarbanes-Oxley Act of 2002, dated March 12, 2020				
32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, dated March 12, 2020**				
32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, dated March 12, 2020**				
101	The following materials from the Registrant's annual report on Form 10-K for the year ended December 31, 2019, formatted in Extensible Business Reporting Language (XBRL) include: (i) Balance Sheets as of December 31, 2019 and 2018, (ii) Statements of Operations, Comprehensive Loss, Stockholders' Equity and Cash Flows for each of the three years in the period ended December 31, 2019, and (iii) Notes to Financial Statements				

† Confidential treatment has been granted for certain portions of this exhibit. Omitted information has been filed separately with the Securities and Exchange Commission.

* Management contract or compensation plan or arrangement.

** The certifications attached as Exhibits 32.1 and 32.2 that accompany this annual report on Form 10-K, are not deemed filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of this Form 10-K), irrespective of any general incorporation language contained in such filing.

ITEM 16. FORM 10-K SUMMARY

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

GERON CORPORATION

Date: March 12, 2020

By: /s/ OLIVIA BLOOM
OLIVIA K. BLOOM
Executive Vice President, Finance, Chief Financial Officer and Treasurer

POWER OF ATTORNEY

KNOW BY ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints, jointly and severally, John A. Scarlett, M.D., and Olivia K. Bloom, and each one of them, attorneys-in-fact for the undersigned, each with the power of substitution, for the undersigned in any and all capacities, to sign any and all amendments to this annual report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his or her substitutes, may do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, each of the undersigned has executed this Power of Attorney as of the date indicated opposite his/her name.

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/ JOHN A. SCARLETT JOHN A. SCARLETT	President, Chief Executive Officer and Chairman of the Board (Principal Executive Officer)	March 12, 2020
/s/ OLIVIA BLOOM OLIVIA K. BLOOM	Executive Vice President, Finance, Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)	March 12, 2020
/s/ DAWN C. BIR DAWN C. BIR	Director	March 12, 2020
/s/ KARIN EASTHAM KARIN EASTHAM	Director	March 12, 2020
/s/ V. BRYAN LAWLIS V. BRYAN LAWLIS	Director	March 12, 2020
/s/ SUSAN MOLINEAUX SUSAN M. MOLINEAUX	Director	March 12, 2020
/s/ ELIZABETH G. O'FARRELL ELIZABETH G. O'FARRELL	Director	March 12, 2020
/s/ ROBERT J. SPIEGEL ROBERT J. SPIEGEL	Director	March 12, 2020

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

1) Registration Statement (Form S-3, No. 333-225184) and in the related prospectuses and prospectus supplements,
2) Registration Statement (Form S-8 No. 333-230171) pertaining to the 2018 Inducement Award Plan,
3) Registration Statement (Form S-8 No. 333-228147) pertaining to the Directors' Market Value Stock Purchase Plan,
4) Registration Statement (Form S-8 No. 333-225190) pertaining to the 2018 Equity Incentive Plan,
5) Registration Statement (Form S-8, No. 333-196677) pertaining to the 2014 Employee Stock Purchase Plan,
6) Registration Statement (Form S-8, No. 333-174350) pertaining to the 2011 Incentive Award Plan, the 2002 Equity Incentive Plan, the 1996 Directors' Stock Option Plan and the 1992 Stock Option Plan,
7) Registration Statements (Forms S-8, No. 333-167349, No. 333-161035, No. 333-152725 and No. 333-145042) pertaining to the 2002 Equity Incentive Plan, and
8) Registration Statement (Form S-8, No. 333-136330) pertaining to the 2002 Equity Incentive Plan and the 2006 Directors' Stock Option Plan;

of our reports dated March 12, 2020, with respect to the financial statements of Geron Corporation and the effectiveness of internal control over financial reporting of Geron Corporation included in this Annual Report (Form 10-K) for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Redwood City, California
March 12, 2020

EXHIBIT 31.1

CERTIFICATION PURSUANT TO
FORM OF RULE 13A-14(A)
AS ADOPTED PURSUANT TO
SECTION 302(A) OF THE SARBANES-OXLEY ACT OF 2002

I, John A. Scarlett, M.D., certify that:

1. I have reviewed this annual report on Form 10-K of Geron Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) 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(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 12, 2020

/s/ JOHN A. SCARLETT
JOHN A. SCARLETT, M.D.
President, Chief Executive Officer and Chairman of the Board

EXHIBIT 31.2

CERTIFICATION PURSUANT TO
FORM OF RULE 13A-14(A)
AS ADOPTED PURSUANT TO
SECTION 302(A) OF THE SARBANES-OXLEY ACT OF 2002

I, Olivia K. Bloom, certify that:

1. I have reviewed this annual report on Form 10-K of Geron Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) 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(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 12, 2020

/s/ OLIVIA K. BLOOM
OLIVIA K. BLOOM
Executive Vice President, Finance,
Chief Financial Officer and Treasurer

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C. Section 1350, as created by Section 906 of the Sarbanes-Oxley Act of 2002, the undersigned officer of Geron Corporation (the "Company") hereby certifies, to such officer's knowledge, that:

(i) the accompanying annual report on Form 10-K of the Company for the year ended December 31, 2019 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 12, 2020

/s/ JOHN A. SCARLETT
JOHN A. SCARLETT, M.D.
President, Chief Executive Officer and Chairman of the Board

This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.

EXHIBIT 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C. Section 1350, as created by Section 906 of the Sarbanes-Oxley Act of 2002, the undersigned officer of Geron Corporation (the "Company") hereby certifies, to such officer's knowledge, that:

(i) the accompanying annual report on Form 10-K of the Company for the year ended December 31, 2019 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 12, 2020

/s/ OLIVIA K. BLOOM
OLIVIA K. BLOOM
Executive Vice President, Finance,
Chief Financial Officer and Treasurer

This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.

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