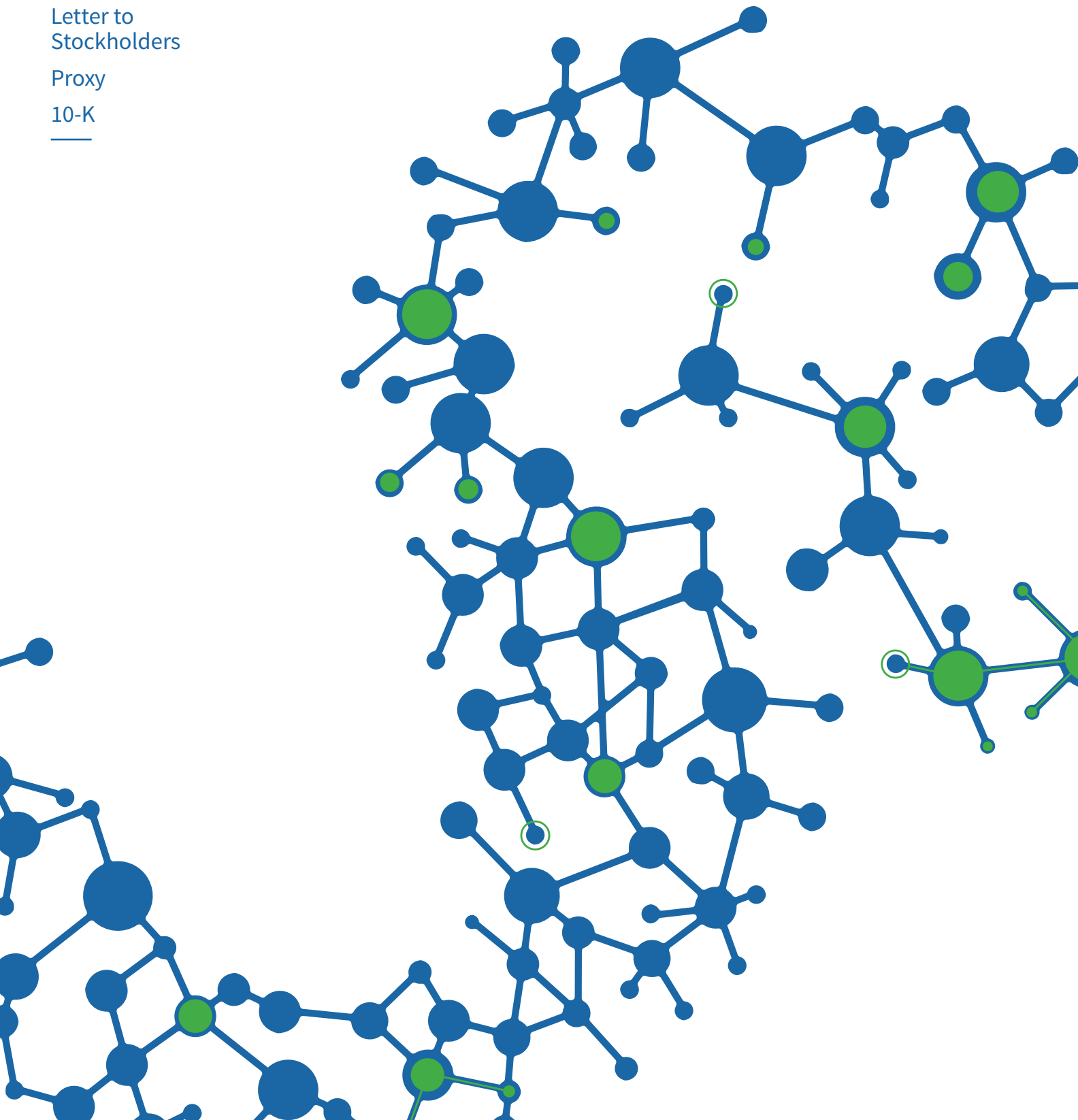
geron

2018 ANNUAL REPORT

Letter to Stockholders

Proxy

10-K



Dear Geron Stockholder,

Today, with 100% global rights to imetelstat, Geron is planning to advance the imetelstat program into late-stage development by beginning a Phase 3 clinical trial by mid-year 2019. Imetelstat is our unique first-in-class telomerase inhibitor, which has demonstrated broad clinical activity in three separate hematologic myeloid malignancies: essential thrombocythemia, Intermediate-2 or High-risk myelofibrosis (MF) relapsed/refractory to janus kinase (JAK) inhibitors, and lower risk myelodysplastic syndromes (MDS).

In December 2018, compelling data from 38 patients were presented at the American Society of Hematology (ASH) Annual Meeting from the Phase 2 portion of IMerge in lower risk MDS, which supports further development of imetelstat. All 38 patients were transfusion dependent with Low or Intermediate-1 risk, non-del(5q) MDS who had relapsed after or were refractory to treatment with an erythropoiesis stimulating agent and naïve to treatment with a hypomethylating agent (HMA) or lenalidomide. The median baseline transfusion burden was eight units of red blood cells given within an eight-week period of time, representing a patient population with a high transfusion burden.

The ASH presentation reported that 37% (14/38) of patients experienced transfusion independence lasting at least eight weeks, which compares favorably to both HMAs and lenalidomide with historical rates of 17% and 27%, respectively. Another important observation was that 70% (10/14) of those patients who achieved 8-week transfusion independence subsequently converted to durable, 24-week transfusion independence. Overall, the entire cohort of 38 patients in the study had a 68% mean reduction in transfusion burden compared to their pre-imetelstat treatment baseline. Based on our market research, physicians value such meaningful reductions in transfusion burden because of the reduction in costs and improvements in quality of life associated with reducing transfusions to this degree. In conclusion, the efficacy results from the Phase 2 portion of IMerge presented at ASH showed potential clinical benefit, including in patients with high transfusion burden, and suggest that imetelstat may have an important role to play in lower risk MDS.

In addition to the Phase 2 portion of IMerge data presented at ASH, data were also presented for imetelstat in relapsed/refractory MF from the Phase 2 IMbark clinical trial. The presentation reported that median overall survival (OS) for the 9.4 mg/kg dosing arm in the IMbark trial was 29.9 months in a poor-prognosis, relapsed/refractory patient population where there are currently no approved treatments today. Other observational studies of similar patient populations at academic medical centers published in medical literature have reported median OS ranges of approximately 14 to 16 months after failure of or discontinuation of ruxolitinib, which is the only approved treatment available for Intermediate-2 or High-risk MF patients. Overall, the data from IMbark presented at ASH encourage us to consider further exploration of the potential use of imetelstat in MF patients who are relapsed/refractory to JAK inhibitors.

We expect 2019 to be a pivotal year for Geron as we prepare for Phase 3 development. Currently, we are diligently managing the transfer of the investigational new drug (IND) sponsorship for imetelstat back to Geron, which is on track to take place by the end of the second quarter. Once the IND transfer has been completed, we plan to commence screening and enrollment for the Phase 3 portion of the IMerge clinical trial for imetelstat in lower risk MDS by mid-year 2019. Based upon our current assumptions for enrollment, patient treatment, and follow up, we estimate topline results from the Phase 3 portion of IMerge to be available by mid-year 2022.

Another objective in 2019 is to outline our decision regarding the potential for late-stage development of imetelstat in MF by the end of the third quarter. While the data from the Phase 2 IMbark clinical trial presented at ASH in December suggest a meaningful survival outcome in relapsed/refractory MF patients, the clinical development path is not as straight forward as lower risk MDS. Our decision whether to continue late-stage development in MF will be influenced by our assessment of what would likely be required to achieve clinical and regulatory success, including the cost and duration of any potential clinical trials. To inform this assessment, we will conduct discussions with key opinion leaders over the coming months, and we expect discussions with regulatory authorities to begin after the IND has transferred back to Geron.

To ensure the continued advancement of the imetelstat development program, we established a key organizational 2019 objective to strategically build a robust development team with hematology-oncology expertise. We believe that having strong in-house hematology-oncology expertise will enhance our ability to execute our clinical development activities in MDS and MF, as well as maximize imetelstat's potential value through future exploration of additional indications.

At the end of January, we welcomed Aleksandra Rizo, M.D., Ph.D., as our new Chief Medical Officer who will lead imetelstat's clinical development strategy. Complementing Dr. Rizo's capabilities, we have hired highly experienced professionals in critical functional areas of clinical science, clinical operations, drug safety, quality and translational research to support not only the imetelstat program, but also other potential assets as we further our plans to build a hematology-oncology franchise in the future.

In summary, we look forward to 2019 being a pivotal year for the future of both imetelstat and Geron. We believe we are firmly on a path to create value for patients and stockholders alike. Thank you for your continued support.

Sincerely,

John A. Scarlett, M.D.
Chairman and Chief Executive Officer

For important information regarding the use of forward-looking statements in this letter to stockholders, please refer to the inside back cover of this annual report.

GERON CORPORATION

149 Commonwealth Drive, Suite 2070
Menlo Park, CA 94025

April 19, 2019

Dear Geron Stockholder:

You are cordially invited to attend the 2019 Annual Meeting of Stockholders of Geron Corporation to be held on Thursday, June 6, 2019, at 8:00 a.m., Pacific Daylight Time, at Geron Corporation's offices located at 149 Commonwealth Drive, Menlo Park, California 94025. In addition, we will be hosting the meeting via conference call which can be accessed via telephone by dialing 1-877-303-9139 (U.S.); 1-760-536-5195 (international). The passcode is 8616608. A live audio-only webcast will also be available at www.geron.com/investors/events.

As permitted by the rules of the Securities and Exchange Commission, we are pleased to furnish our proxy materials to stockholders primarily over the Internet. Consequently, most stockholders will receive a notice with instructions for accessing proxy materials and voting via the Internet, instead of paper copies of proxy materials. However, this notice will provide information on how stockholders may obtain paper copies of proxy materials if they choose. Stockholders who continue to receive hard copies of proxy materials may help us reduce costs by opting to receive future proxy materials by e-mail.

At this year's Annual Meeting, the agenda includes the following items:

- election of the two nominees for director named in the accompanying proxy statement to hold office as Class II members of the Board of Directors until the 2022 annual meeting of stockholders;
- approval to increase the total number of authorized shares of our common stock from 300,000,000 to 450,000,0000 shares;
- advisory vote to approve named executive officer compensation; and
- ratification of Ernst & Young LLP as our independent registered public accounting firm.

Your vote is important to us. Whether or not you plan to attend the meeting, please vote electronically via the Internet or by telephone, or, if you requested paper copies of the proxy materials, please complete, sign, date and return the accompanying proxy card in the enclosed postage-paid envelope, as promptly as possible. If you attend the Annual Meeting, you will have the right to vote your shares in person.

Thank you for your ongoing support of, and continued interest in, Geron Corporation.

Sincerely,

John A. Scarlett, M.D.
Chairman of the Board, President and Chief Executive Officer

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GERON CORPORATION
149 Commonwealth Drive, Suite 2070
Menlo Park, CA 94025

NOTICE OF ANNUAL MEETING OF STOCKHOLDERS
To Be Held on June 6, 2019

To the Stockholders of Geron Corporation:

NOTICE IS HEREBY GIVEN that the Annual Meeting of Stockholders (the "Annual Meeting") of GERON CORPORATION, a Delaware corporation (the "Company"), will be held on June 6, 2019, at 8:00 a.m., Pacific Daylight Time, at the Company's offices located at 149 Commonwealth Drive, Menlo Park, California 94025. Stockholders may also access the meeting via telephone by dialing 1-877-303-9139 (U.S.); 1-760-536-5195 (international). The passcode is 8616608. A live audio-only webcast will also be available at www.geron.com/investors/events. The meeting will be held for the following purposes:

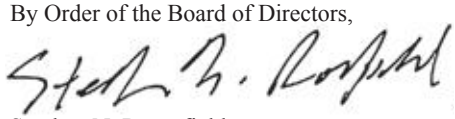
1. To elect the two nominees for director named in the accompanying proxy statement (the "Proxy Statement") to hold office as Class II members of the Board of Directors until the 2022 annual meeting of stockholders;
2. To approve an amendment to the Company's Restated Certificate of Incorporation to increase the total number of authorized shares of the Company's Common Stock from 300,000,000 to 450,000,000 shares;
3. To approve, on an advisory basis, the compensation of the Company's named executive officers, as disclosed in the Proxy Statement;
4. To ratify the selection by the Audit Committee of the Board of Directors of Ernst & Young LLP as the Company's independent registered public accounting firm for the fiscal year ending December 31, 2019; and
5. To transact such other business as may properly come before the Annual Meeting or any postponement or adjournment thereof.

The foregoing items of business are more fully described in the Proxy Statement accompanying this Notice.

The Board of Directors has fixed the close of business on April 8, 2019, as the record date for the determination of stockholders entitled to notice of and to vote at the Annual Meeting and at any adjournment or postponement thereof. Each stockholder is entitled to one vote for each share of common stock held at that time.

Your Vote Is Important To Us. Whether or not you plan to attend the meeting, please vote electronically via the Internet or by telephone, or, if you requested paper copies of the proxy materials, please complete, sign, date and return the accompanying proxy card in the enclosed postage-paid envelope, as promptly as possible. Please note, however, that if your shares are held of record by a broker, bank or other nominee and you wish to vote at the meeting, you must obtain from the record holder a proxy issued in your name.

By Order of the Board of Directors,



Stephen N. Rosenfield
Executive Vice President,
Chief Legal Officer and Corporate Secretary

Menlo Park, California
April 19, 2019

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to Be Held on June 6, 2019:
Letter to Stockholders, Notice and 2019 Proxy Statement, and 2018 Annual Report on Form 10-K are available at www.proxyvote.com.

YOUR VOTE IS VERY IMPORTANT, REGARDLESS OF THE NUMBER OF SHARES YOU OWN. WHETHER OR NOT YOU EXPECT TO ATTEND THE MEETING, WE URGE YOU TO SUBMIT YOUR PROXY PROMPTLY IN ORDER TO ASSURE THAT A QUORUM IS PRESENT.

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GERON CORPORATION

149 Commonwealth Drive, Suite 2070
Menlo Park, CA 94025

PROXY STATEMENT
FOR THE ANNUAL MEETING OF STOCKHOLDERS
TO BE HELD ON JUNE 6, 2019

QUESTIONS AND ANSWERS ABOUT THESE PROXY MATERIALS AND VOTING

Why am I receiving these materials?

You are receiving this annual meeting information and Proxy Statement from us because you owned shares of common stock of Geron Corporation, a Delaware corporation ("Geron," the "Company," "we" or "us"), as of April 8, 2019, the record date for our 2019 Annual Meeting of Stockholders (the "Annual Meeting"), to be held on June 6, 2019, at 8:00 a.m., Pacific Daylight Time, at the Company's offices located at 149 Commonwealth Drive, Menlo Park, California 94025, or at any adjournment or postponement thereof. The Geron Board of Directors (the "Board") has made these materials available to you in connection with the Board's solicitation of proxies for use at the Annual Meeting. You may vote by proxy over the Internet or by phone, or by mail if you requested printed copies of the proxy materials.

As permitted by the rules of the Securities and Exchange Commission (the "SEC"), we are providing our stockholders access to proxy materials via the Internet. Accordingly, we are sending by mail only a Notice of Availability of Proxy Materials (the "Notice") to certain of our stockholders of record and posting our proxy materials online at www.proxyvote.com. Stockholders who previously requested to receive hard copies of proxy materials will receive a full set of proxy materials, instead of the Notice. We intend to distribute the Notice and the proxy materials on or about April 25, 2019 to all stockholders of record entitled to vote at the Annual Meeting.

What does it mean if I receive more than one set of proxy materials or more than one Notice, or combination thereof?

If you receive more than one set of proxy materials, or more than one Notice or a combination thereof, your shares may be registered in more than one name or may be registered in different accounts. Please follow the voting instructions on each set of proxy materials or Notices to ensure that all of your shares are voted.

Will I receive any proxy materials by mail other than the Notice?

No, you will not receive any other proxy materials by mail other than the Notice unless you request paper copies. This Proxy Statement and Geron's 2018 Annual Report on Form 10-K are available at www.proxyvote.com. You may request a full set of proxy materials be sent to your specified postal or email address as follows:

- by telephone: call 1-800-579-1639 free of charge and follow the instructions;
- by Internet: go to www.proxyvote.com and follow the instructions; or
- by e-mail: send an e-mail message to sendmaterial@proxyvote.com. Please send a blank e-mail and insert the 16-Digit Control Number located in your Notice in the subject line.

To sign up for electronic delivery of proxy materials, please follow the instructions provided with your proxy materials and on your proxy card or voting instruction card, to vote using the Internet and, when prompted, indicate that you agree to receive or access future stockholder communications electronically. Alternatively, you can go to www.proxyvote.com and enroll for online delivery of proxy materials. A stockholder's election to receive proxy materials by mail or electronically by email will remain in effect until the stockholder terminates such election.

What is the purpose of the Annual Meeting?

At our Annual Meeting, stockholders will act upon the matters described in this Proxy Statement. In addition, following the meeting, management will report on current events at Geron and respond to questions from stockholders.

How can I participate in the Annual Meeting?

All stockholders are cordially invited to attend the Annual Meeting in person at the Company's offices located at 149 Commonwealth Drive, Menlo Park, California 94025. For directions to attend the Annual Meeting, please contact CG Capital at (877) 889-1792 or by email at investor@geron.com.

If you cannot attend the meeting in person, you may participate via telephone by dialing 1-877-303-9139 (U.S.); 1-760-536-5195 (international). The passcode is 8616608. We recommend that you dial in at least 10 minutes early to minimize any delay in joining the meeting. Participants joining via telephone will also have an opportunity to ask questions during the meeting.

The Annual Meeting will also be available via the Internet in a live audio-only webcast available at www.geron.com/investors/events. The audio webcast of the Annual Meeting will be available for replay approximately one hour following the live meeting through July 6, 2019. Since the webcast is audio-only, participants will be unable to ask questions in this forum.

Who can vote at the Annual Meeting?

Only holders of record at the close of business on April 8, 2019 (the "Record Date") will be entitled to notice of and to vote at the Annual Meeting or any adjournment or postponement thereof. At the close of business on the Record Date, we had 186,456,047 shares of common stock, par value $0.001 per share ("Common Stock"), outstanding. Each holder of record of Common Stock on the Record Date will be entitled to one vote for each share held on all matters to be voted upon at the Annual Meeting. The stock transfer books will not be closed between the Record Date and the Annual Meeting date. A list of stockholders entitled to vote at the Annual Meeting will be available for examination at our principal executive offices at the address listed above for a period of ten days prior to the Annual Meeting and during the Annual Meeting.

A quorum of stockholders is necessary to hold a valid meeting. In order to constitute a quorum and to transact business at the Annual Meeting, a majority of the outstanding shares of Common Stock on the Record Date must be represented at the Annual Meeting. Shares represented by proxies that reflect abstentions or "broker non-votes" will be counted as shares that are present and entitled to vote for purposes of determining the presence of a quorum.

What am I voting on at the Annual Meeting? What is the Board's recommendation on each of the proposals?

You are being asked to vote on four proposals, as follows:

Proposal Number	Proposal	Board Recommends
1	To elect the two nominees for director named in this Proxy Statement to hold office as Class II members of our Board of Directors until the 2022 annual meeting of stockholders.	**FOR BOTH director nominees**
2	To approve an amendment to our Restated Certificate of Incorporation to increase the total number of authorized shares of our Common Stock from 300,000,000 to 450,000,000 shares.	**FOR**
3	To approve, on an advisory basis, the compensation of our named executive officers, as disclosed in this Proxy Statement.	**FOR**
4	To ratify the selection by the Audit Committee of the Board of Directors of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2019.	**FOR**

How many votes are needed to approve each proposal? What is the effect of abstentions and broker non-votes on each of the proposals?

The following table summarizes the minimum vote needed to approve each proposal and the effect of abstentions and broker non-votes on each of the proposals:

Proposal Number	Proposal	Votes Required to Approve Proposal	Effect of Abstentions	Effect of Broker Non-Votes
1	To elect the two nominees for director named in this Proxy Statement to hold office as Class II members of our Board of Directors until the 2022 annual meeting of stockholders.	The two nominees receiving the most "FOR" votes properly cast in person or by proxy will be elected. Only votes "FOR" will affect the outcome of the vote; "WITHHOLD" votes will have no effect on the outcome of the vote. However, under our Corporate Governance Guidelines, any nominee for director is required to submit an offer of resignation for consideration by the Nominating and Corporate Governance Committee if such nominee for director receives a greater number of "WITHHOLD" votes from his or her election than votes "FOR" such election. In such case, the Nominating and Corporate Governance Committee will then consider all of the relevant facts and circumstances and recommend to the Board the action to be taken with respect to such offer of resignation.	Not applicable	No effect
2	To approve an amendment to our Restated Certificate of Incorporation to increase the total number of authorized shares of our Common Stock from 300,000,000 to 450,000,000 shares.	The affirmative vote of the holders of a majority of the outstanding shares entitled to vote on this matter.	Against	Not applicable(1)
3	To approve, on an advisory basis, the compensation of our named executive officers, as disclosed in this Proxy Statement.	The affirmative vote of the holders of a majority of the shares having voting power present in person or represented by proxy at the Annual Meeting.	Against	No effect
4	To ratify the selection by the Audit Committee of the Board of Directors of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2019.	The affirmative vote of the holders of a majority of the shares having voting power present in person or represented by proxy at the Annual Meeting.	Against	Not applicable(1)

(1) This proposal is considered to be a "routine" matter under NYSE rules. Accordingly, if you hold your shares in street name and do not provide voting instructions to your broker, bank or other agent that holds your shares, your broker, bank or other agent has discretionary authority under NYSE rules to vote your shares on this proposal. For more information, see "If I am a beneficial owner of shares held in street name and I do not provide my broker or bank with my voting instructions, what happens?" and "What are broker non-votes?" below.

What are the choices in voting?

For Proposal 1, you may either vote "FOR" both nominees to the Board of Directors or you may "WITHHOLD" your vote for both nominees or any nominee you specify. For proposals 2, 3 and 4, you may vote "FOR" the proposal or "AGAINST" the proposal or "ABSTAIN" from voting on the proposal.

Could other matters be decided at the Annual Meeting?

Our Bylaws require that we receive advance notice of any proposal to be brought before the Annual Meeting by our stockholders, and we have not received notice of any such proposals. If any other matter were to be properly submitted for a vote at the Annual Meeting, the proxy holders appointed by the Board will have the discretion to vote on those matters for you as they see fit. This includes, among other things, considering any motion to adjourn the Annual Meeting to another time and/or place, including for the purpose of soliciting additional proxies for or against a given proposal.

How do I vote my shares and what are the voting deadlines?

Please refer to the proxy card for instructions on, and access information for, voting by telephone, over the Internet or by mail.

Stockholder of Record: Shares Registered In Your Name

You are a stockholder of record if, on the Record Date, your shares were registered directly in your name with our transfer agent, Computershare Trust Company, N.A. As a stockholder of record, there are several ways for you to vote your shares.

- **Via the Internet.** You may vote at www.proxyvote.com, 24 hours a day, seven days a week. You will need the 16-Digit Control Number included on your Notice or your proxy card (if you received a printed copy of the proxy materials). Votes submitted through the Internet must be received by 11:59 p.m., Eastern Time, on June 5, 2019.
- **By Telephone.** You may vote using a touch-tone telephone by calling 1-800-690-6903, 24 hours a day, seven days a week. You will need the 16-Digit Control Number included on your Notice or your proxy card (if you received a printed copy of the proxy materials). Votes submitted by telephone must be received by 11:59 p.m., Eastern Time, on June 5, 2019.
- **By Mail.** If you received printed proxy materials, you may submit your vote by completing, signing, and dating each proxy card received and returning it in the postage-paid envelope. Sign your name exactly as it appears on the proxy card. Proxy cards submitted by mail must be received no later than June 5, 2019 to be voted at the Annual Meeting.
- **During the Annual Meeting.** Stockholders may also submit their vote if they attend the Annual Meeting in person.

The Internet and telephone voting procedures described above, which comply with Delaware law, are designed to authenticate stockholders' identities, to allow stockholders to vote their shares, and to confirm that their instructions have been properly recorded. However, please be aware that you must bear any costs associated with your Internet access, such as usage charges from Internet access providers and telephone companies.

Beneficial Owner: Shares Registered in the Name of a Broker or Bank

You are a beneficial owner, if on the Record Date, your shares were held in an account at a brokerage firm, bank, dealer, or other similar organization and not in your name. The organization holding your account is considered to be the stockholder of record for purposes of voting at the Annual Meeting. Being a beneficial owner means that, like most stockholders, your shares are held in "street name" and these proxy materials are being forwarded to you by that organization.

As a beneficial owner, you should have received a Notice or voting instructions from the broker or other nominee holding your shares. You should follow the instructions in the Notice or voting instructions provided by your broker or nominee in order to instruct your broker or other nominee on how to vote your shares. The availability of telephone and Internet voting will depend on the voting process of the broker or nominee. Please contact your bank, broker or other agent if you have questions about their instructions on how to vote your shares. To vote in person at the 2019 Annual Meeting, you must obtain a valid proxy from your broker, bank, or other agent, and attend the meeting in person to submit your vote.

If you do not provide your broker or bank with instructions on how to vote your shares, your broker or bank will be able to vote your shares with respect to the approval of an amendment to our Restated Certificate of Incorporation to increase the total number of authorized shares of our Common Stock from 300,000,000 to 450,000,000 shares (Proposal 2) and ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2019 (Proposal 4). For more information, see "If I am a beneficial owner of shares held in street name and I do not provide my broker or bank with my voting instructions, what happens?" and "What are broker non-votes?" below.

Geron Plan Participants

As trustee of the Geron 401(k) Plan, Prudential Bank and Trust FSB will receive a proxy that incorporates all the shares owned by the Geron 401(k) Plan and will vote such proxy as directed by the Geron 401(k) sponsor.

If you purchased through the 1996 Employee Stock Purchase Plan and the 2014 Employee Stock Purchase Plan and your shares are held in the name of a broker, please refer to the discussion above under "Beneficial Owner: Shares Registered in the Name of a Broker or Bank."

If I am a shareholder of record and I do not vote, or if I return a proxy card or otherwise vote without giving specific voting instructions, what happens?

If you are a stockholder of record and you do not specify your vote on each proposal individually when voting via the Internet, over the telephone or if you sign and return a proxy card without giving specific voting instructions, then your shares will be voted in line with the Board recommendations above as described under "What am I voting on at the Annual Meeting? What is the Board's recommendation on each of the proposals?" If any other matter is properly presented at the 2019 Annual Meeting, your proxyholder (one of the individuals named on your proxy card) will vote your shares using his or her best judgment.

If I am a beneficial owner of shares held in street name and I do not provide my broker or bank with my voting instructions, what happens?

If you are a beneficial owner of shares registered in the name of your broker, bank or other agent, and you do not instruct your broker, bank or other agent how to vote your shares, your broker, bank or other agent may still be able to vote your shares in its discretion. In this regard, under the rules of the New York Stock Exchange (NYSE), brokers, banks and other securities intermediaries that are subject to NYSE rules may use their discretion to vote your "uninstructed" shares with respect to matters considered to be "routine" under NYSE rules, but not with respect to "non-routine" matters. In this regard, Proposals 1 and 3 are considered to be "non-routine" under NYSE rules meaning that your broker may not vote your shares on those proposals in the absence of your voting instructions. However, Proposals 2 and 4 are considered to be "routine" matters under NYSE rules meaning that if you do not return voting instructions to your broker by its deadline, your shares may be voted by your broker in its discretion on Proposals 2 and 4.

If you are a beneficial owner of shares held in street name, in order to ensure your shares are voted in the way you would prefer, you must provide voting instructions to your broker, bank or other agent by the deadline provided in the materials you receive from your broker, bank or other agent.

What are broker non-votes?

As discussed above, when a beneficial owner of shares held in street name does not give voting instructions to his or her broker, bank or other securities intermediary holding his or her shares as to how to vote on matters deemed to be "non-routine" under NYSE rules, the broker, bank or other such agent cannot vote the shares. These un-voted shares are counted as "broker non-votes." Proposals 1 and 3 are considered to be "non-routine" under NYSE rules and we therefore expect broker non-votes to exist in connection with those proposals.

As a reminder, if you are a beneficial owner of shares held in street name, in order to ensure your shares are voted in the way you would prefer, you must provide voting instructions to your broker, bank or other agent by the deadline provided in the materials you receive from your broker, bank or other agent.

Can I revoke or change my vote after I submit my proxy?

Stockholder of Record: Shares Registered in Your Name

If you are a stockholder of record, you may revoke or change your vote at any time before the final vote at the Annual Meeting by:

- signing and returning a new proxy card with a later date;
- submitting a later-dated vote by telephone or via the Internet — only your latest Internet or telephone proxy received by 11:59 p.m., Eastern Time, on June 5, 2019, will be counted;
- attending the Annual Meeting in person and voting again; or
- delivering a written revocation to our Corporate Secretary at Geron's offices, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025, before the Annual Meeting.

Beneficial Owner: Shares Registered in the Name of a Broker or Bank

If you are a beneficial owner of your shares, you must contact the broker or other nominee holding your shares and follow their instructions for revoking or changing your vote.

How will your proxy be counted?

Votes will be counted by the Inspector of Election appointed for the Annual Meeting, who will separately count "FOR," "WITHHOLD" and broker non-votes with respect to Proposal 1 regarding the election of directors, and, with respect to Proposals 2, 3 and 4, "FOR" and "AGAINST" votes, abstentions and, as applicable, broker non-votes.

Is my vote confidential?

Yes. Proxy cards, ballots and voting tabulations that identify stockholders by name are kept confidential. There are exceptions for contested proxy solicitations or when necessary to meet legal requirements. In addition, all comments written on a proxy card or elsewhere will be forwarded to management, but your identity will be kept confidential unless you ask that your name be disclosed.

How can I find out the results of the voting at the Annual Meeting?

Preliminary voting results will be announced at the Annual Meeting. Final voting results will be published by Geron in a Current Report on Form 8-K, filed with the SEC, that we expect to file within four business days after the Annual Meeting. If final voting results are not available to us in time to file a Current Report on Form 8-K within four business days after the Annual Meeting, we intend to file a Current Report on Form 8-K to

publish preliminary results and, within four business days after the final results are known to us, file an additional Current Report on Form 8-K to publish the final results.

Who is paying for this proxy solicitation?

We will pay the entire cost of solicitation of proxies, including preparation, assembly, printing and mailing of this Proxy Statement, the proxy card and any additional information furnished to stockholders. Copies of solicitation materials will be furnished to banks, brokerage houses, fiduciaries and custodians holding in their names shares of Common Stock beneficially owned by others to forward to such beneficial owners. In addition, we may reimburse persons representing beneficial owners of Common Stock for their costs of forwarding solicitation materials to such beneficial owners. The original solicitation of proxies by mail may be supplemented by solicitation by mail, telephone or other electronic means, or in person, by our directors, officers, or other regular employees, or at our request, by Alliance Advisors, LLC. No additional compensation will be paid to directors, officers or other regular employees for such services, but Alliance Advisors will be paid its customary fee, estimated to be $6,000, to render solicitation services.

When are stockholder proposals due for next year's Annual Meeting?

See the sub-section entitled "Stockholder Nominations and Proposals for 2020 Annual Meeting" under the section entitled "Other Matters."

How can I obtain a copy of Geron's Annual Report on Form 10-K?

We will mail to you without charge, upon written request, a copy of our Annual Report on Form 10-K filed with the SEC for the fiscal year ended December 31, 2018, as well as a copy of any exhibit specifically requested. Requests should be sent to: Corporate Secretary, Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025. A copy of our Annual Report on Form 10-K has also been filed with the SEC and may be accessed from the SEC's homepage (www.sec.gov). You may also view and download our 2018 Annual Report on Form 10-K on our website at www.geron.com as well as www.proxyvote.com.

What is householding and how does it affect me?

Some brokers and other nominee record holders may be participating in the practice of "householding" proxy statements. This means that only one copy of this Proxy Statement and 2018 Annual Report on Form 10-K or the Notice may have been sent to multiple stockholders in a stockholder's household. Once you have received notice from your broker that they will be "householding" communications to your address, "householding" will continue until you are notified otherwise or until you revoke your consent. If, at any time, you no longer wish to participate in "householding" and would prefer to receive separate copies of the proxy statement, annual report or the notice of internet availability of proxy materials, please notify your broker or our Investor Relations department. We will promptly deliver copies of the Proxy Statement and our 2018 Annual Report on Form 10-K or the Notice to any stockholder who contacts CG Capital at (877) 889-1972 or by mail addressed to Investor Relations, Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025, requesting such copies. If you receive multiple copies of the proxy statement and annual report at your household and would like to receive a single copy of the proxy statement and annual report for your household in the future, you should contact your broker, other nominee record holder, or our Investor Relations department to request a single copy of the proxy statement and annual report.

MATTERS TO BE CONSIDERED AT THE 2019 ANNUAL MEETING

PROPOSAL 1

ELECTION OF DIRECTORS

Board Structure

Our Board currently consists of eight directors, seven of whom are "independent," as that term is defined by Nasdaq Rule 5602(a)(2), and one of whom is an executive officer of the Company. Our Bylaws provide for the classification of the Board into three classes with staggered terms of office so that one class of the Board is elected annually, and each class of directors stands for election every three years.

The term of office of the Class II directors, Daniel M. Bradbury, Dawn C. Bir and Elizabeth G. O'Farrell will expire at the Annual Meeting in June 2019. Effective December 26, 2018, Hoyoung Huh, M.D., Ph.D., a former Class II director, resigned from the Board, including his roles as Chairman of the Board and as a member of the Nominating and Corporate Governance Committee, for personal reasons. On January 30, 2019, Daniel M. Bradbury, a Class II director, notified the Company of his decision to not stand for re-election at the Annual Meeting due to his new responsibilities as a chief executive officer of another public company. As a result, there are two nominees for election as Class II directors at the Annual Meeting, Mses. Bir and O'Farrell, both of whom were recently appointed to the Board in March 2019. Proxies may only be voted for the two Class II directors nominated for election at the Annual Meeting.

The Class III directors, Karin Eastham; V. Bryan Lawlis, Ph.D.; and Susan Molineaux, Ph.D., have one year remaining on their terms of office. The Class I directors, John A. Scarlett, M.D.; and Robert J. Spiegel, M.D., FACP, have two years remaining on their terms of office.

The following table provides summary information about each director nominee and currently-serving director as of March 31, 2019:

			Committee Memberships			
Name and Principal Position	**Age**	**Independent**	**AC**	**CC**	**NG**	**Other Public Boards**
2019 Director Nominees						
Dawn C. Bir Chief Commercial Officer, Reata Pharmaceuticals, Inc.	48	Yes			M	None
Elizabeth G. O'Farrell Independent Director	55	Yes	M			1
Currently Serving Directors						
Daniel M. Bradbury [(1)] Independent Director	57	Yes	M, FE		M	3
Karin Eastham Retired C.P.A. Lead Independent Director	69	Yes	C, FE	M		3
V. Bryan Lawlis, Ph.D. Independent Director	67	Yes	M	M		4
Susan M. Molineaux, Ph.D. President, Chief Executive Officer and Director, Calithera Biosciences, Inc. Independent Director	65	Yes			C	2
John A. Scarlett, M.D. Chairman of the Board, President, and Chief Executive Officer	68	No				2
Robert J. Spiegel, M.D., FACP Independent Director	69	Yes		C		2

AC: Audit Committee

CC: Compensation Committee

NG: Nominating and Corporate Governance Committee

C: Chair

M: Member

FE: Financial Expert

(1): In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will not be standing for re-election at the Annual Meeting; accordingly, his term of office will expire at the Annual Meeting.

NOMINEES FOR ELECTION TO THE BOARD OF DIRECTORS
For a Three-Year Term Expiring at the 2022 Annual Meeting

The Board has selected two nominees for Class II directors, Ms. Dawn C. Bir and Ms. Elizabeth G. O'Farrell, both of whom were appointed to the Board in March 2019 and neither of whom were previously elected by stockholders.

Set forth below is a brief biography of each nominee for Class II director, the periods during which they have served as a director of Geron, and information furnished by them as to principal occupations and public company directorships held by them. The biographies below also include a discussion of the specific experience, qualifications, attributes or skills of each nominee that led the Nominating and Corporate Governance Committee and the Board to conclude, as of the date of this Proxy Statement, that each nominee for Class II director should continue to serve as a director. Each person nominated for election has consented to being named as a nominee in this Proxy Statement and has agreed to serve if elected, and the Board has no reason to believe that any nominee will be unable to serve.

It is a key objective of the Company to have a diverse Board, representing a range of expertise, skills, perspectives and experiences in areas that are relevant to the Company's business and the needs of the Board. As stated in our Nominating and Corporate Governance Committee Charter and our Corporate Governance Guidelines, as part of the director search process, the Nominating and Corporate Governance Committee endeavors to consider qualified candidates, including women and minorities, who meet the relevant business and search criteria. In furtherance of the foregoing, where a third-party search firm is engaged and requested to furnish an initial list of possible candidates, such firm will be requested to include in such list women and minority candidates who meet such criteria. Regarding the appointments of Mses. Bir and O'Farrell in March 2019, a third-party search firm provided the Nominating and Corporate Governance Committee with a slate of potential candidates for consideration, which included Mses. Bir and O'Farrell. After reviewing the potential candidates, the Nominative and Corporate Governance Committee selected Mses. Bir and O'Farrell from such slate based on their qualifications and background, performed further evaluation of each of their particular experiences, qualifications, attributes and skills, and then recommended their appointment to the Board.

Class II Director Nominees (Term Expiring at the 2022 Annual Meeting)

Dawn C. Bir

Experience

Ms. Bir has served as a director of Geron since March 2019. Since September 2016, Ms. Bir has served as the Chief Commercial Officer of Reata Pharmaceuticals, Inc., a biopharmaceutical company, where she leads marketing, market access, sales, and commercial operations. From February 2013 to September 2016, Ms. Bir served as Vice President of Sales with Pharmacyclics LLC, an AbbVie company, where she built and led their first hematology national sales organization, and was responsible for the launch of IMBRUVICA in the United States and Puerto Rico. From October 2011 to February 2013, Ms. Bir served as Vice President of Sales & Marketing of SKY Pharmaceuticals Packaging, Inc. & Rx Pak, a unit within the U.S. pharmaceutical and specialty solutions division of McKesson Corporation, a global healthcare company, where she was responsible for two companies and revenue centers, and led multiple functions, including sales, marketing, contract management, project management and customer service. From 1996 to October 2011, Ms. Bir held several commercial and sales positions of increasing responsibility within Genentech, Inc., a member of the Roche Group, a global pharmaceutical company, and Bristol-Myers Squibb Company, a global pharmaceutical company. Ms. Bir holds a B.S. in Biology from Binghamton University.

Qualifications

The Board believes Ms. Bir's extensive commercial, sales and marketing expertise, including with hematology-oncology products, broadens the Board's ability to advise, evaluate and analyze future potential commercialization activities for imetelstat, especially in the United States, as well as to provide insights into the competitive landscape of

other hematology-oncology products. This knowledge and experience, together with her strong leadership ability as a female executive in the healthcare industry, qualify Ms. Bir to be elected as a director.

Elizabeth G. O'Farrell

Experience

Ms. O'Farrell has served as a director of Geron since March 2019. Ms. O'Farrell also serves as a member of the boards directors of PDL BioPharma, Inc., since June 2018, a company focused on acquiring and managing a portfolio of companies, products, royalty agreements and debt facilities in the healthcare industry, and a privately-held biotechnology company. Since January 2018, Ms. O'Farrell also served on the finance committee of the United Way of Brevard (Brevard County, Florida), a non-profit organization. In December 2017, Ms. O'Farrell retired from a 24-year career with Eli Lilly and Company, a global pharmaceutical company, where she held several senior management positions in finance and corporate governance, most recently serving as Chief Procurement Officer and Head of Global Shared Services from January 2012 to December 2017. Prior to that position, she also served as Senior Vice President, Policy and Finance; Senior Vice President, Finance; Chief Financial Officer, Lilly USA; Chief Financial Officer, Lilly Canada; and General Auditor. Before joining Eli Lilly, Ms. O'Farrell was an accountant with Boise Cascade Office Products, and served as an auditor at Whipple & Company, a professional accountancy firm, and Price Waterhouse, an international public accounting firm. Ms. O'Farrell holds a B.S. in accounting with honors and an M.B.A. in management information systems, both from Indiana University.

Qualifications

Ms. O'Farrell's significant financial, operational and corporate governance expertise strengthens the Board's collective knowledge related to compliance, financial reporting and internal controls. In addition, Ms. O'Farrell's management and leadership experience, gained through the various roles she has served in, also provides unique and valuable insights to the Board regarding organizational development for a growing company, as Geron pursues late-stage development and potential commercialization of imetelstat. The Board believes Ms. O'Farrell's knowledge and experience as a senior female executive with a long tenure at a large global pharmaceutical company qualify Ms. O'Farrell to be elected as a director.

Vote Required

Directors are elected by a plurality of the votes of the holders of shares present in person or represented by proxy at the meeting. Each of the two nominees receiving the highest number of "FOR" votes properly cast in person or by proxy at the meeting will be elected as a Class II director of Geron. In tabulating the voting results for the election of directors, only "FOR" and "WITHHOLD" votes and broker non-votes are counted. "WITHHOLD" votes and broker non-votes will not have any effect on the outcome of the election. In the event that any nominee should be unavailable for election as a result of an unexpected occurrence, shares that would have been voted for that nominee will instead will be voted for the election of a substitute nominee, if any, proposed by the Nominating and Corporate Governance Committee and the Board.

Although the election of directors at the Annual Meeting is uncontested and directors are elected by a plurality of votes cast, and we therefore expect that each of the named nominees for director will be elected at the Annual Meeting, under our Corporate Governance Guidelines, any nominee for director is required to submit an offer of resignation for consideration by the Nominating and Corporate Governance Committee if such nominee for director (in an uncontested election) receives a greater number of "WITHHOLD" votes from her election than votes "FOR" such election. In such case, the Nominating and Corporate Governance Committee will then consider all of the relevant facts and circumstances and recommend to the Board the action to be taken with respect to such offer of resignation. Promptly following the Board's decision, we would disclose that decision and an explanation of such decision in a filing with the SEC or a press release.

The Board of Directors Unanimously Recommends That Stockholders Vote FOR the Election of Both Nominees to the Board of Directors

MEMBERS OF THE BOARD OF DIRECTORS CONTINUING IN OFFICE AFTER THE ANNUAL MEETING

Set forth below is a brief biography of each continuing director composing the remainder of the Board with terms expiring as shown, including the periods during which they have served as a director of Geron, and information furnished by them as to principal occupations and public company directorships held by them. The biographies below also include a discussion of the specific experience, qualifications, attributes or skills of each continuing director that led the Nominating and Corporate Governance Committee and the Board to conclude, as of the date of this Proxy Statement, that the applicable director should continue to serve as a director.

Class III Directors (Term Expiring at the 2020 Annual Meeting)

Karin Eastham

Experience

Ms. Eastham has served as a director of Geron since March 2009, and as Lead Independent Director of the Board since December 2018. Ms. Eastham also serves as a member of the boards of directors of Illumina, Inc., a manufacturer of life science tools and reagents, since July 2004; Veracyte, Inc., a molecular diagnostics company, since December 2012; and Nektar Therapeutics, a clinical-stage biopharmaceutical company, since September 2018. Ms. Eastham previously served as a director of MorphoSys AG, a Frankfurt Stock Exchange-listed biotechnology company, from May 2012 to May 2017; Trius Therapeutics, Inc., a biopharmaceutical company, from 2009 until its sale in 2013; Amylin Pharmaceuticals, Inc., a biopharmaceutical company focused on diabetes and metabolic disorders, from 2005 until its sale in 2012; and Genoptix, Inc., a provider of specialized laboratory services, from 2008 until its sale in 2011. From 1976 until her retirement in September 2008, Ms. Eastham has held several senior management positions in finance in the biopharmaceutical industry, including with the Burnham Institute for Medical Research, a non-profit corporation engaged in basic biomedical research; Diversa Corporation, a biotechnology company; CombiChem, Inc., a computational chemistry company; Cytel Corporation, a biopharmaceutical company; and Boehringer Mannheim Corporation, a biopharmaceutical company. Ms. Eastham holds a B.S. and an M.B.A. from Indiana University and is a retired Certified Public Accountant.

Qualifications

The Board believes Ms. Eastham's understanding of biotechnology companies, combined with her business leadership and financial experience, her contributions to the Board's understanding of corporate governance and strategy for life science companies through her experience as a director in the biopharmaceutical industry, and her extensive senior management experience in the biopharmaceutical industry, particularly in key corporate finance and accounting positions, provides important perspectives to the Board. In addition, the Board believes Ms. Eastham's financial expertise and deep business experience, as well as her demonstrated commitment to our Board and her extensive knowledge of Geron's business and strategies, based on her service on Geron's Board since 2009, qualifies her to serve as director.

V. Bryan Lawlis, Ph.D.

Experience

Dr. Lawlis has served as a director of Geron since March 2012. He also serves as a member of the boards of directors of BioMarin Pharmaceutical, Inc., a biopharmaceutical company specializing in rare genetic diseases, since June 2007; Coherus BioSciences, Inc., a biologics platform company specializing in biosimilars, since May 2014; Sutro Biopharma, Inc., a biologics platform company specializing in therapeutics for cancer and autoimmune disorders, since January 2004; Aeglea BioTherapeutics, Inc., a biotechnology company specializing in human enzyme therapeutics for rare genetic diseases and cancer, since July 2018; and several privately-held biotechnology companies. From August 2013 to September 2014, Dr. Lawlis served as a member of the board of directors of KaloBios Pharmaceuticals, Inc., a biopharmaceutical company. Dr. Lawlis was also the President and Chief Executive Officer of Itero Biopharmaceuticals LLC, a privately-held, early stage

biopharmaceutical company that he co-founded, from 2006 to 2011, and has served as an advisor to Phoenix Venture Partners, a venture capital firm specializing in manufacturing technologies, since October 2015. Dr. Lawlis held several senior management positions in the biopharmaceutical industry, including President and Chief Executive Officer of Aradigm Corporation, a specialty drug company focused on drug delivery technologies, and President and Chief Executive Officer of Covance Biotechnology Services, a contract biopharmaceutical manufacturing operation, which he co-founded. Dr. Lawlis holds a B.A. in microbiology from the University of Texas at Austin and a Ph.D. in biochemistry from Washington State University.

Qualifications

The Board believes Dr. Lawlis' extensive experience in manufacturing biotechnology and other pharmaceutical products, as well as his expertise in the research and development of drug products and in the management and conduct of clinical trials and drug regulatory processes, qualifies Dr. Lawlis to serve as a director.

Susan M. Molineaux, Ph.D.

Experience

Dr. Molineaux has served as a director of Geron since September 2012. Dr. Molineaux has been Chief Executive Officer, President and a member of the board of directors of Calithera Biosciences, Inc., a biotechnology company developing oncology therapeutics, since co-founding the company in June 2010. She also serves as a member of the board of directors of Theravance Biopharma, Inc., a biopharmaceutical company located in South San Francisco, since April 2015, where she is a member of the Sciences and Technology Committee, and as a Scientific Advisor to Lightstone Ventures, a private life sciences investment company, since September 2016. Prior to Calithera, Dr. Molineaux co-founded Proteolix, Inc., a privately-held oncology-oriented biopharmaceutical company, where she served as Chief Scientific Officer from December 2003 until December 2005 and from February 2009 until November 2009, and as President and Chief Executive Officer from January 2006 until February 2009, until the company's acquisition by Onyx Pharmaceuticals, Inc., a global oncology-oriented biopharmaceutical company, in November 2009. Previously, Dr. Molineaux held several senior management positions in the biopharmaceutical industry, including Vice President of Biology at Rigel Pharmaceuticals, Inc., a biopharmaceutical company focused on inflammatory and autoimmune diseases; Vice President of Biology at Praelux, Inc., a biopharmaceutical company; and Vice President of Drug Development at Praecis Pharmaceuticals, Inc., an oncology-focused biopharmaceutical company. Dr. Molineaux holds a B.S. in biology from Smith College, a Ph.D. in molecular biology from Johns Hopkins University, and completed a postdoctoral fellowship at Columbia University.

Qualifications

Dr. Molineaux has demonstrated her ability to dedicate sufficient time and focus on her duties as a director of Geron, including her role as Chair of our Nominating and Corporate Governance Committee. As President and director of Calithera, Dr. Molineaux does not serve on any Calithera board committees, and accordingly serves only on board committees for Geron and Theravance. In the past year, Dr. Molineaux has attended 100% of the meetings for Geron's Board and Geron's Nominating and Corporate Governance Committee, and 100% of the meetings for Theravance's board. Dr. Molineaux's duties on Theravance's Science and Technology Committee are limited in scope and therefore our Board believes that her membership on that committee does not interfere with her ability to reliably devote time to Geron's Board, as well as Geron's Nominating and Corporate Governance Committee. In accordance with our Board's standard practice, Dr. Molineaux reviews scheduled Geron Board and committee meeting dates a year in advance to confirm availability to participate and attend all Board and committee meetings. All the companies for which she serves as a director are located in the San Francisco Bay Area, enabling her to travel and regularly attend Geron's Board and committee meetings. Dr. Molineaux does not serve on the board of any privately-held companies.

The Board believes Dr. Molineaux's extensive experience in pharmaceutical and oncology drug development, and her expertise in managing and conducting clinical trials, qualifies Dr. Molineaux to be a director of the Company. The Board and the Nominating and Corporate Governance Committee also believe that Dr. Molineaux provides great value to the Board and contributes significantly to discussions and decision-making. Dr. Molineaux has extensive experience in the biotechnology industry, with current executive experience at Calithera. Accordingly, the Board believes that Dr. Molineaux's contributions as director are substantial, based upon her business and scientific expertise acquired in successfully holding executive and leadership positions in biotechnology companies, and her demonstrated reliability and commitment to service on our Board and Nominating and Corporate Governance Committee. Dr. Molineaux's knowledge of the biotechnology industry and business, and healthcare related issues, combined with her experience as the chief executive officer of a public company, qualifies her to serve as a director.

Class I Directors (Term Expiring at the 2021 Annual Meeting)

John A. Scarlett, M.D.

Experience

Dr. Scarlett has served as our Chairman of the Board effective December 2018, our Chief Executive Officer and a director since joining Geron in September 2011 and President since January 2012. Dr. Scarlett also serves as a member of the boards of directors for Chiasma, Inc., a biopharmaceutical company focused on transforming injectable drugs into oral medications, since February 2015, and CytomX Therapeutics, Inc., an oncology-oriented company, 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, a privately-held company focused on endocrine disorders. 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, a global pharmaceutical company. 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.

Qualifications

As the only management representative on the Board, Dr. Scarlett brings management's perspective to the Board's discussions about Geron's business and strategic direction. In addition, the Board believes Dr. Scarlett's deep understanding of what makes businesses work effectively and efficiently, as well as his medical background and extensive drug development experience, provide valuable insights to the Board. See discussion below regarding Board Leadership and Governance in connection with the appointment of a Lead Independent Director who provides leadership for the independent members of the Board.

Serving as a director for other publicly-held biopharmaceutical companies provides Dr. Scarlett with alternate viewpoints on business strategy and board decision-making, which we believe enhances his contributions to our Board. Dr. Scarlett has demonstrated his ability to dedicate sufficient time and focus on his duties as a member of our Board and attended 100% of our Board meetings in 2018. In accordance with our Board's standard practice, Dr. Scarlett reviews scheduled Board meeting dates a year in advance to confirm availability to participate and attend all our Board meetings, and prioritizes Geron's meetings over Chiasma and CytomX board meetings. Accordingly, the Board believes Dr. Scarlet's business and medical expertise acquired in successfully holding executive and leadership positions in biotechnology companies, and his demonstrated

reliability and commitment to service on our Board, qualifies him to serve as a director and Chairman of the Board.

Robert J. Spiegel, M.D., FACP

Experience

Dr. Spiegel has served as a director of Geron since May 2010. Dr. Spiegel currently serves as an Associate Professor at the Weill Cornell Medical School, a Senior Advisor to Warburg Pincus, a private equity firm, and an Advisor to the Israel Biotech Fund, a venture investment fund. He is also a member of the boards of directors of Edge Therapeutics, Inc., a biotechnology company, since August 2013; Cyclacel Pharmaceuticals, Inc., a biopharmaceutical company developing targeted medicines for cancer and other proliferative diseases; since September 2018; and several privately-held biotechnology companies. He previously served as a director for Avior Computing Corporation, a privately-held governance risk and compliance process technology company, from October 2011 to November 2017; Talon Therapeutics, Inc., a biopharmaceutical company, from July 2010 to July 2013; Capstone Therapeutics Corp., a biotechnology company, from May 2010 to January 2012; Sucampo Pharmaceuticals, Inc., a biopharmaceutical company, from January 2015 to January 2018; the Cancer Institute of New Jersey from 1999 to 2009; and Cancer Care New Jersey from 1995 to 2011. From March 2011 to April 2016, Dr. Spiegel served as Chief Medical Officer of PTC Therapeutics, Inc., a biopharmaceutical company focused on discovering and developing treatments for rare disorders. In 2009, after 26 years with the Schering-Plough Corporation (now Merck & Co.), a global healthcare company, Dr. Spiegel retired as Chief Medical Officer and Senior Vice President of the Schering-Plough Research Institute, the pharmaceutical research arm of the Schering-Plough Corporation. His career at Schering-Plough involved various positions, including Director of clinical research for oncology, Vice President of clinical research, and Senior Vice President of worldwide clinical research. Following a residency in internal medicine, Dr. Spiegel completed a fellowship in medical oncology at the National Cancer Institute, and from 1981 to 1999 he held academic positions at the National Cancer Institute and New York University Cancer Center. Dr. Spiegel holds a B.A. from Yale University and an M.D. from the University of Pennsylvania.

Qualifications

The Board believes Dr. Spiegel's extensive medical experience developing oncology products, his deep understanding of pharmaceutical research and development, and broad expertise in gaining regulatory approval for drug candidates, enhances the Board's ability to critically assess the progress and potential of imetelstat, and qualifies Dr. Spiegel to serve as a director.

DIRECTOR WITH TERM EXPIRING AT THE ANNUAL MEETING

As noted above, Mr. Bradbury has advised the Board that he will not stand for reelection at the Annual Meeting. Accordingly, his term of office will expire at the Annual Meeting. Mr. Bradbury has served as a director of Geron since September 2012. He is the Chief Executive Officer, Chairman and co-founder of Equillium, Inc., a biotechnology company focused on developing products for severe autoimmune and inflammatory disorders. He also serves as a member of the board of directors of Intercept Pharmaceuticals, Inc., a biopharmaceutical company focused on the development and commercialization of novel therapeutics for non-viral liver diseases, since July 2016, and Corcept Therapeutics Incorporated, a company focused on the discovery and development of drugs that regulate the effects of cortisol, since October 2012. Additionally, Mr. Bradbury serves on the boards of directors of several privately-held companies. Mr. Bradbury previously served as a member of the boards of directors of BioMed Realty Trust, Inc., a real estate investment trust, from January 2013 to January 2016; and Illumina, Inc., a manufacturer of life science tools and reagents, from January 2004 to May 2017. Mr. Bradbury is a member of the board of trustees of the Keck Graduate Institute and an advisory board member for the University of California San Diego, Rady School of Management's Deans Advisory Board, and the BioMed Ventures Advisory Committee. Mr. Bradbury held several senior positions at Amylin Pharmaceuticals, Inc., a biopharmaceutical company focused on diabetes and metabolic disorders, including Chief Executive Officer from March 2007 until its acquisition by Bristol-Myers Squibb Company in August

2012. In addition, Mr. Bradbury served as a member of the board of directors of Amylin from June 2006 until August 2012. Prior to joining Amylin, he spent ten years at SmithKline Beecham Pharmaceuticals, a pharmaceutical company, holding a number of sales and marketing positions. He received a Bachelor of Pharmacy from Nottingham University and a Diploma in Management Studies from Harrow and Ealing Colleges of Higher Education in the United Kingdom.

BOARD LEADERSHIP AND GOVERNANCE

We have an ongoing commitment to excellence in corporate governance and business practices. In furtherance of this commitment, we regularly monitor developments in the area of corporate governance and review our processes, policies and procedures in light of such developments. Key information regarding our corporate governance initiatives can be found on the Corporate Governance page under the Investor Relations section of our website at www.geron.com, including our Corporate Governance Guidelines, Code of Conduct, Insider Trading Policy, Privacy Policy and the charters for our Audit, Compensation and Nominating and Corporate Governance committees. We believe that our corporate governance policies and practices, including the substantial percentage of independent directors on our board of directors and the leadership provided by our Lead Independent Director, Ms. Eastham, empower our independent directors to effectively oversee our management—including the performance of our Chief Executive Officer—and provide an effective and appropriately balanced board governance structure.

Corporate Governance Guidelines

Our Board has adopted Corporate Governance Guidelines that set forth key principles to guide the operation of the Board and its committees in the exercise of their responsibilities to serve the interests of Geron and our stockholders. As stated in our Nominating and Corporate Governance Committee Charter and our Corporate Governance Guidelines, as part of the director search process, the Nominating and Corporate Governance Committee endeavors to consider qualified candidates, including women and minorities, who meet the relevant business and search criteria. In furtherance of the foregoing, where a third-party search firm is engaged and requested to furnish an initial list of possible candidates, such firm will be requested to include in such list women and minority candidates who meet such criteria.

The current form of the Corporate Governance Guidelines can be found on the Corporate Governance page under the Investor Relations section of our website at www.geron.com. In addition, these guidelines are available in print to any stockholder who requests a copy. Please direct all requests to our Corporate Secretary, Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025.

Board Independence

In accordance with Nasdaq listing standards and Geron's Corporate Governance Guidelines, a majority of the members of our board of directors must qualify as "independent" as defined by Nasdaq Rule 5605(a)(2). In keeping with these guidelines, a member of our Board may serve as a director of another company only to the extent such position does not conflict or interfere with such person's service as a director of Geron. The Board consults with our counsel to ensure that the Board's determinations regarding Board independence are consistent with relevant securities and other laws and regulations regarding the definition of "independent," including those set forth in pertinent listing standards of Nasdaq, as in effect from time to time.

Consistent with these considerations, our Board has determined affirmatively that Mses. Bir and O'Farrell, nominees for election at the Annual Meeting, and all current and continuing directors, with the exception of Dr. Scarlett, are independent with the meaning of the Nasdaq listing standards. Dr. Scarlett, who is our Chairman of the Board, President and Chief Executive Officer, is the sole non-independent director, and the Board regularly meets in executive sessions outside the presence of Dr. Scarlett. The Board previously determined that Dr. Huh, who resigned from the Board effective December 26, 2018, was independent within the meaning of the Nasdaq listing standards.

There are no family relationships between any director and any of our executive officers. There are no arrangements or agreements relating to compensation provided by a third party to any member of our Board, including current nominees for director, in connection with their candidacy or board service to us.

Board Leadership Structure

In December 2018, Dr. Huh, who was an independent director and Chairman of the Board, resigned from the Board for personal reasons. Effective December 27, 2018, the Board appointed Dr. Scarlett to serve as Chairman of the Board, in addition to his role as President and Chief Executive Officer of the Company. Particularly in light of the rapid growth the Company expects to experience as it resumes development of imetelstat on its own, the Board at this time believes that Dr. Scarlett is best suited to serve as our Chairman because he is the member of the Board who is most familiar with our business as a whole and the most capable of identifying and bringing to the attention of the full Board the strategic priorities and key issues facing the Company. The Board also believes that having Dr. Scarlett in a combined Chairman/Chief Executive Officer role helps provide strong, unified leadership for our management team. To counterbalance our Board's decision to have a combined Chairman and Chief Executive Officer, the Company's Corporate Governance Guidelines require that the Board appoint a Lead Independent Director when the role of Chairman is held by a director who does not qualify as an independent director. Accordingly effective December 27, 2018, the Board appointed Ms. Eastham to serve as Lead Independent Director for the Board. In her role as Lead Independent Director, Ms. Eastham facilitates Board interactions and information flow. The structure also allows for a clear communication path for the non-employee directors, who may raise any issues or concerns that they have directly with the Lead Independent Director.

The Chairman of the Board has the authority, among other things, to call and preside over Board meetings, to set meeting agendas and to determine materials to be distributed to the Board. However, the Lead Independent Director provides active leadership on behalf of the independent directors on the Board. With the Chairman, President and Chief Executive Officer, Dr. Scarlett, the Lead Independent Director, Ms. Eastham, advises on Board meeting agendas and discussion priorities. In addition, the Lead Independent Director provides regular communications to directors between meetings, inviting comments, ideas and concerns from each non-employee director. The Lead Independent Director also has the following responsibilities:

- Presiding at executive sessions of non-employee directors;
- Serving as a liaison between the Board Chairman and non-employee directors;
- Advising the Board Chairman regarding the impression of the non-employee directors as to the quality, quantity and timeliness of the flow of information from the Company that is necessary for the Board to effectively perform its duties; and
- Accepting additional responsibilities as may be recommended from time-to-time by the Board or the non-employee directors of the Board.

Board Committees and Meetings

It is Geron's policy to encourage directors to attend annual meetings of stockholders. All of our current directors, except Dr. Lawlis, attended our 2018 Annual Meeting. During the fiscal year ended December 31, 2018, the Board held seven meetings and acted once by unanimous written consent. The Board has an Audit Committee, a Compensation Committee, and a Nominating and Corporate Governance Committee. During the fiscal year ended December 31, 2018, each of the directors attended at least 75% of the aggregate number of meetings of the Board and the committees on which the director served during the portion of the last fiscal year for which he or she was a director or committee member, except for Dr. Lawlis who achieved a 74% attendance rate in 2018 due to family medical issues.

Below is a description of each committee of the Board. Each of the committees has authority to engage and determine the compensation for legal counsel or other experts or consultants, as it deems appropriate, to assist with fulfilling its responsibilities. The Board has determined that each member of each committee meets

the applicable Nasdaq and SEC rules and regulations regarding "independence" and that each member is free of any relationship that would impair his or her individual exercise of independent judgement with regard to Geron.

Audit Committee

The Audit Committee operates under a written charter that satisfies the applicable standards of the SEC and Nasdaq. A copy of the Audit Committee charter is available on our website at www.geron.com. The Audit Committee held eight meetings in 2018 and acted once by unanimous written consent. The Audit Committee's responsibilities include:

- appointing or terminating, approving the compensation of, and assessing the qualifications, performance and independence of our independent registered public accounting firm;
- pre-approving audit and permissible non-audit services and the terms of such services to be provided by our independent registered public accounting firm;
- reviewing the plan and scope of the annual audit of financial statements with the independent registered public accounting firm and members of management;
- reviewing and discussing with management and/or the independent registered public accounting firm, prior to public disclosure, our annual and quarterly financial statements and related disclosures in our Forms 10-K, Forms 10-Q, and earnings press releases, including critical accounting policies and practices used by us and information contained in "Management's Discussion and Analysis of Financial Condition and Results of Operations;"
- recommending to the Board, based upon the Audit Committee's review and discussions with management and the independent registered public accounting firm, whether our audited financial statements shall be included in our Annual Report on Form 10-K;
- monitoring our internal control over financial reporting and disclosure controls and procedures, including reviewing management's assessment and disclosures related to any significant changes, material weaknesses or significant deficiencies;
- overseeing compliance with legal and regulatory requirements as they relate to our financial statements and accounting matters, including our insider trading compliance program;
- establishing policies and procedures for the receipt and retention of whistleblower complaints and concerns and overall compliance with our Code of Conduct;
- preparing the audit committee report required by the SEC to be included in our annual proxy statement;
- reviewing and approving or ratifying any related party transactions; and
- overseeing financial and operation risk exposures and the actions management has taken to limit, monitor and control such exposures.

The Board has determined that all of the members of the Audit Committee are financially literate and that two members of the Audit Committee, Ms. Eastham and Mr. Bradbury, have accounting and financial management expertise that qualifies each as an "Audit Committee Financial Expert," as such term is defined in Item 407(d)(5) of Regulation S-K promulgated by the SEC. See more information about the Audit Committee in the section entitled "Audit Committee Report." In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Audit Committee and the Nominating and Corporate Governance Committee of the Company effective June 6, 2019, the date of the Annual Meeting. In March 2019, Ms. O'Farrell was appointed to the Audit Committee.

Compensation Committee

The Compensation Committee operates under a written charter that satisfies the applicable standards of the SEC and Nasdaq. A copy of the Compensation Committee charter is available on our website at www.geron.com. The charter of the Compensation Committee allows it to delegate responsibilities to a subcommittee of the Compensation Committee, but only to the extent consistent with our certificate of incorporation, Bylaws and Nasdaq rules. The Compensation Committee held seven meetings in 2018 and acted twice by unanimous written consent. The Compensation Committee's responsibilities include:

- establishing and overseeing our executive compensation philosophy and strategy;
- reviewing and approving the terms of any employment agreements, severance arrangements, change in control protections and other compensatory arrangements for our executive officers, including our Chief Executive Officer;
- annually reviewing and recommending to the Board corporate goals and objectives relevant to the compensation of our executive officers, including our Chief Executive Officer;
- reviewing and approving, or making recommendations to the Board with respect to, the compensation of our executive officers, including our Chief Executive Officer, based upon an annual evaluation of each individual's performance;
- overseeing and administering our cash and equity incentive plans, including establishing policies and procedures for the grant of equity-based awards and approving, or making recommendation to the full Board with respect to, the grant of such equity-based awards;
- appointing, compensating and overseeing the work of any compensation and benefits consultants, legal counsel or other experts or advisors retained by the Compensation Committee, including an independence assessment as outlined by Nasdaq rules;
- reviewing and discussing with management our compensation discussion and analysis disclosure to be included in our annual proxy statement;
- reviewing and making recommendations to our Board regarding non-employee director compensation; and
- reviewing and assessing the potential impact of our compensation practices on enterprise risk.

For information on the Compensation Committee's processes and procedures on the consideration and determination of executive compensation, see the sub-section entitled "Compensation Discussion and Analysis – Role of the Compensation Committee." For information on the Compensation Committee's processes and procedures with respect to non-employee director compensation matters, see the section entitled "Compensation of Directors."

Compensation Committee Interlocks and Insider Participation

Drs. Lawlis and Spiegel and Ms. Eastham served on the Compensation Committee for the entire fiscal year ended December 31, 2018. Neither Drs. Lawlis or Spiegel, nor Ms. Eastham, is a former or current officer or employee of Geron. None of our executive officers serves as a member of a compensation committee of any entity that has one or more executive officers serving as a member of our Board or Compensation Committee.

Nominating and Corporate Governance Committee

The Nominating and Corporate Governance Committee operates under a written charter that satisfies the applicable standards of the SEC and Nasdaq. A copy of the Nominating and Corporate Governance Committee charter is available on our website at www.geron.com. The Nominating and Corporate Governance Committee held two meetings in 2018. The Nominating and Corporate Governance Committee's responsibilities include:

- developing, reviewing and recommending to the Board a set of corporate governance guidelines and principles;
- creating and recommending to the Board criteria for Board and committee membership;
- establishing procedures for identifying and evaluating individuals qualified to become members of the Board, including nominees recommended by stockholders;
- recommending to the Board the persons to be nominated for election or re-election as directors;
- reviewing and recommending to the Board the functions, duties and compositions of the Board committees;
- considering and reporting to the Board any questions of possible conflicts of interest of Board members; and
- assessing the performance of the Board, the Board committees and individual directors.

Specific qualifications and the process for recommending director candidates are provided in more detail under the sub-sections entitled "Director Nominees Recommended by Stockholders" and "Director Qualifications." As stated in our Nominating and Corporate Governance Committee Charter and our Corporate Governance Guidelines, as part of the director search process, the Nominating and Corporate Governance Committee endeavors to consider qualified candidates, including women and minorities, who meet the relevant business and search criteria. In furtherance of the foregoing, where a third-party search firm is engaged and requested to furnish an initial list of possible candidates, such firm will be requested to include in such list women and minority candidates who meet such criteria. The Nominating and Corporate Governance Committee will investigate, evaluate and interview, as appropriate, a director candidate with regard to his or her individual qualifications and expertise as well as how those characteristics fit with the needs of the Board and the long-term interests of our stockholders.

In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Nominating and Corporate Governance Committee of the Company effective June 6, 2019, the date of the Annual Meeting. In March 2019, Ms. Bir was appointed to the Nominating and Corporate Governance Committee.

Board's Role in Risk Oversight

Geron is subject to a variety of risks, including those described under the section entitled "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2018. Some risks may be readily perceived and even quantified, while others are unexpected or unforeseeable. Risks can be external or can arise as a result of our internal business or financial activities.

The Board and our executive management team work together to manage our risks. It is management's responsibility to identify various risks facing the Company, bring the Board's attention to material risks, and implement appropriate risk management policies and procedures to manage risk exposure on a day-to-day basis. The Board has an active role in overseeing our risk management process directly or through its committees.

The Board has delegated responsibility for the oversight of specific risks to the Board committees as follows:

- The Audit Committee oversees management of financial risks. In addition to fulfilling its responsibilities for the oversight of our financial reporting processes and annual audit of Geron's financial statements, the Audit Committee also reviews with the Company's independent registered public accounting firm and the Company's management the adequacy and effectiveness of our policies and procedures to assess, monitor and manage fraud risk and our ethical compliance program. The Audit Committee takes appropriate actions to set the best practices and highest standards for quality financial reporting, sound business risk practices, including practices related to cybersecurity, and ethical behavior.
- The Compensation Committee is responsible for overseeing the management of risks relating to our employment policies and executive compensation plans and arrangements. In connection with structuring the executive compensation program, the Compensation Committee, together with the Board, considers whether the elements of such program, individually or in the aggregate, encourage our Named Executive Officers to take unnecessary risks. For further information, see the sub-section entitled "Risk Assessment of Compensation Policies and Practices."
- The Nominating and Corporate Governance Committee manages Geron's corporate governance practices. In addition, the Nominating and Corporate Governance Committee reviews risks associated with the independence of the Board, potential conflicts of interest and risks relating to management and Board succession planning.

While each committee is responsible for evaluating certain risks and overseeing the management of such risks within its respective oversight area, the entire Board is regularly informed through committee reports about such risks.

Risk Assessment of Compensation Policies and Practices

The Compensation Committee maintains a pay for performance compensation philosophy, but also recognizes that providing certain types of compensation incentives may inadvertently motivate individuals to act in ways that could be detrimental to the Company in order to maximize individual compensation. To minimize such risk, the Compensation Committee annually evaluates our compensation philosophy generally as it relates to all employees, as well as individual compensation elements of base salary, annual performance-based bonuses, equity awards, severance and change in control benefits and other benefits to ensure each is evaluated against appropriate standards and that such incentives provide for the achievement of target goals that are balanced between short-term rewards and long-term enhancement of stockholder value.

The Compensation Committee believes the following elements of our compensation program mitigate the risks associated with our compensation practices:

- setting annual base salaries consistent with the responsibilities of our Named Executive Officers and market comparables to ensure that our Named Executive Officers are not motivated to take excessive risks to achieve a reasonable level of financial security;
- establishing corporate goals for our annual performance-based bonus program that are consistent with our annual operating and strategic plans and are designed to achieve a proper risk/reward balance without excessive risk taking;
- requiring an executive officer to forfeit his or her entire annual performance-based bonus if we determine that such executive officer has engaged in any misconduct intended to affect the payment of his or her annual performance-based bonus, or has otherwise engaged in any act or omission that would constitute cause for termination of his or her employment, as defined by his or her employment agreement;

- having a mix of fixed and variable, annual and long-term and cash and equity compensation elements to encourage strategies and actions that balance short-term and long-term best interests;
- granting stock option awards which provide value only if the market price of our Common Stock increases to encourage our Named Executive Officers to take a long-term view of our business and performance-based stock option awards that only vest upon the attainment of specific strategic milestones;
- absence of employment agreements or contracts that contain multi-year guarantees of salary increases, or non-performance-based bonuses or equity compensation;
- emphasizing pay equity amongst our employees and with reference to external comparators; and
- having available, to the Compensation Committee and the Board, the discretion to measure and calculate achievement of corporate goals and other corporate performance measures, which prevents the compensation program from being susceptible to manipulation by a single employee.

The Compensation Committee has reviewed our compensation policies and practices as they relate to all employees and has determined that such policies and practices do not present any risks that are reasonably likely to have a material adverse effect on Geron, and instead, encourage behaviors that support sustainable value generation. In addition, the Compensation Committee has reviewed and evaluated our executive compensation program and believes that our executive compensation policies and practices do not encourage inappropriate actions or risk taking by our executive officers.

OTHER CORPORATE GOVERNANCE MATTERS

Code of Conduct

In 2003, we adopted a Code of Conduct, which is available in its entirety on the Corporate Governance page in the Investor Relations section of our website at www.geron.com and to any stockholder otherwise requesting a copy. All our directors, employees, executive officers, including our Chief Executive Officer and Chief Financial Officer, are required to adhere to the Code of Conduct in discharging their work-related responsibilities. Employees are required to report any conduct they believe in good faith to be an actual or apparent violation of the Code of Conduct. Amendments to the Code of Conduct, and any waivers from the Code of Conduct granted to our directors or executive officers, will be made available through our website as they are adopted. Accordingly, we intend to satisfy the disclosure requirement under Item 5.05 of Form 8-K regarding an amendment to, or waiver from, a provision of the Code of Conduct by posting such information on our website at www.geron.com.

Whistleblower Policy

In keeping with the Sarbanes-Oxley Act of 2002, the Audit Committee has established procedures for the receipt and handling of complaints received by us regarding accounting, internal accounting controls, auditing matters, questionable financial practices or violations of our Code of Conduct ("complaints"). Contact information for an external hotline that is maintained by an independent third party has been distributed to all employees and consultants to allow for the confidential, anonymous submission of complaints by our employees and consultants. Any complaints received by this hotline are reviewed by the Audit Committee and our Chief Legal Officer.

Prohibitions on Derivative, Hedging, Monetization and Other Transactions

We maintain an insider trading policy that applies to all directors and employees, including our executive officers, which prohibits certain transactions in our Common Stock, including short sales, puts, calls or other transactions involving derivative securities, hedging or monetization transactions, purchases of our Common Stock on margin or borrowing against an account in which our Common Stock is held, or pledging our Common Stock as collateral for a loan. Our Audit Committee oversees compliance with our insider trading

program, including approval of any material updates to the insider trading program. Our Chief Legal Officer serves as our insider trading compliance officer and reports, at least once annually, to the Audit Committee on his monitoring of the insider trading program. In addition, the Audit Committee meets with the Compliance Officer outside of the presence of any other executive officers. A copy of our insider trading policy is available on our website at www.geron.com.

Communications with the Board

Stockholders wishing to communicate with the Board, or with a specific Board member, may do so by writing to the Board, or to the individual Board member, and delivering the communication in person or mailing it to: Board of Directors, c/o Stephen N. Rosenfield, Corporate Secretary, Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025. All mail addressed in this manner will be delivered to the Chair or Chairs of the Board committees with responsibilities touching most closely on the matters addressed in the communication. From time to time, the Board may change the process by which stockholders may communicate with the Board or its members. Please refer to our website for any changes to this process.

COMPENSATION OF DIRECTORS

The Compensation Committee determines non-employee director compensation, which the full Board reviews and approves upon recommendation from the Compensation Committee. When considering non-employee director compensation decisions, the Compensation Committee believes it is important to be informed as to current compensation practices of comparable publicly-held companies in the life sciences industry, especially to understand the demand and competitiveness for attracting and retaining an individual with each of the non-employee director's specific expertise and experience. Our compensation arrangements for our non-employee directors are set forth in our Non-Employee Director Compensation Policy (the "Director Compensation Policy"). The Director Compensation Policy outlines cash and equity compensation automatically payable to non-employee directors of the Board, unless such non-employee director declines receipt of such cash or equity compensation by written notice to us. Traditionally, the Compensation Committee has reviewed our non-employee director compensation relative to industry practices every other year.

In January 2018, Radford, an independent compensation consultant, conducted a review of non-employee director compensation in comparison to our industry peer group based on Geron's market capitalization, revenue, stage of development and size of company, that was selected by Radford in 2017. Based on this review, and guidance from Radford, effective January 31, 2018, the Board approved an amendment to the Director Compensation Policy to increase the size of the Initial Grant described below from 100,000 to 120,000 shares of Common Stock and the size of the Annual Grant described below from 50,000 to 70,000 shares of Common Stock, and to increase the additional cash retainer paid to the Chairman of the Board from $30,000 annually to $35,000 annually.

In May 2018, the Director Compensation Policy was amended to incorporate reference to the 2018 Equity Incentive Plan (the "2018 Plan"), as adopted by the Company's stockholders effective May 15, 2018, in connection with equity compensation. In October 2018, the Director Compensation Policy was amended to incorporate reference to the Directors' Market Value Stock Purchase Plan (the "Directors Market Value Plan") which the Board adopted in October 2018. Under the Directors Market Value Plan, to the extent permitted by the Director Compensation Policy, the cash compensation payable to a non-employee director who has formally elected to receive such cash compensation instead in the form of shares of Common Stock will be used to purchase shares of Common Stock from Geron under the Directors Market Value Plan on the date that such cash compensation is payable to the non-employee director under the Director Compensation Policy. On such date, we apply the amount of such cash compensation to the purchase of shares of Common Stock, subject to the limitations and other terms of the Directors Market Value Plan. The purchase price of each share of Common Stock acquired pursuant to the Directors Market Value Plan is equal to the "market value" on the purchase date (which generally means the consolidated closing bid price per share of Common Stock as reported by Nasdaq on the purchase date). A total of 1,000,000 shares of Common Stock has been reserved for the Directors Market Value Plan. The Directors Market Value Plan is intended to qualify for the limited

exemption from stockholder approval pursuant to Nasdaq Listing 5635(c)(2), as a plan that merely provides a convenient way to purchase shares from the Company at market value.

In January 2019, as a result of the change in Board leadership structure, Radford conducted a review of non-employee director compensation for lead independent directors in comparison to our industry peer group that was selected by Radford in 2018. Based on this review, and guidance from Radford, effective January 30, 2019, the Board approved an amendment to the Director Compensation Policy to add annual cash compensation of $25,000 for the Lead Independent Director role, given the recent changes to the Board's leadership structure. For further discussion of the defined peer group recommended by Radford in 2018, see the sub-section entitled "Use of Market Data and Peer Group Analysis."

Cash Compensation

The following table describes the annual cash compensation applicable to each role performed by non-employee directors as outlined in the Director Compensation Policy in effect for the fiscal year ended December 31, 2018 ("fiscal 2018"):

Non-Employee Director Role	Base Retainer	Additional Retainer
Board member	$ 42,500	N/A
Chairman of the Board[(1)]	N/A	$ 35,000
Audit Committee Chair[(2)]	N/A	$ 25,000
Compensation Committee Chair[(2)]	N/A	$ 15,000
Nominating and Corporate Governance Committee Chair[(2)]	N/A	$ 10,000
Audit Committee member	N/A	$ 12,500
Compensation Committee member	N/A	$ 7,500
Nominating and Corporate Governance Committee member	N/A	$ 5,000

(1) Effective January 30, 2019, an additional annual cash retainer of $25,000 was adopted for the Lead Independent Director role on the Board, which the Board retroactively applied beginning January 1, 2019 for Ms. Eastham.

(2) Committee Chair does not also receive additional Committee member compensation.

Under the Director Compensation Policy, annual non-employee director cash compensation is paid quarterly in arrears in cash, or, at each director's election, in fully vested shares of our Common Stock. In 2018, such Common Stock was issued under the 2018 Plan. With the effectiveness of the Directors Market Value Plan, such Common Stock will be issued under the Directors Market Value Plan starting in 2019, as described above, based on the "market value" on the purchase date (which generally means the consolidated closing bid price per share of Common Stock as reported by Nasdaq on the purchase date).

Additionally, under the Director Compensation Policy, non-employee directors are eligible to receive equity grants, as more fully described below under the sub-section entitled "Equity Compensation." Non-employee directors also receive reimbursement for out-of-pocket expenses incurred in connection with attendance at meetings of the Board.

Director Compensation Table

The following table provides compensation information for fiscal 2018, for each non-employee director of the Board who served in such capacity during fiscal 2018. Dr. Scarlett does not receive any compensation for his Board service.

Non-Employee Director	Fees Earned or Paid in Cash ($)		Option Awards ($)[1]	Total ($)
Bradbury, Daniel [2]	60,000	[3]	164,395	224,395
Eastham, Karin	75,000		164,395	239,395
Huh, Hoyoung [4]	80,962		164,395	245,357
Lawlis, V. Bryan	62,500		164,395	226,895
Molineaux, Susan	52,500	[5]	164,395	216,895
Spiegel, Robert	57,500	[6]	164,395	221,895

(1) Amounts represent the aggregate grant date fair value of stock option awards granted during the fiscal year ended December 31, 2018 as calculated in accordance with Financial Accounting Standards Board Accounting Standards Codification Topic 718 ("FASB ASC Topic 718"). Refer to Note 7 of the financial statements in our Annual Report on Form 10-K for the year ended December 31, 2018 regarding assumptions underlying the valuation of stock option awards and the calculation method. For information regarding the aggregate number of stock option awards held by the non-employee directors of the Board at December 31, 2018, see the sub-section entitled "Outstanding Equity Awards at Fiscal Year-End for Non-Employee Directors."

(2) In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Audit Committee and the Nominating and Corporate Governance Committee of the Company effective June 6, 2019, the date of the Annual Meeting.

(3) Represents fees paid in stock in lieu of cash through the issuance of an aggregate 31,425 shares of Common Stock under the 2018 Plan.

(4) Effective December 26, 2018, Dr. Huh resigned from the Board for personal reasons.

(5) Represents fees paid in stock in lieu of cash through the issuance of an aggregate 27,497 shares of Common Stock under the 2018 Plan.

(6) Includes $28,750 in fees paid in stock in lieu of cash through the issuance of an aggregate 15,058 shares of Common Stock under the 2018 Plan.

Equity Compensation

Terms of Awards

Pursuant to the Director Compensation Policy, each individual who first becomes a non-employee director receives an initial stock option grant and thereafter each non-employee director is eligible to receive stock option grants on an annual basis. Non-employee director stock options are currently granted pursuant to the 2018 Plan, in accordance with the Director Compensation Policy. The following describes the equity compensation arrangements as outlined in the Director Compensation Policy in effect for fiscal 2018:

- *Initial Grant.* Each individual who first becomes a non-employee director, whether by election by Geron's stockholders or by appointment by the Board to fill a vacancy, automatically will be granted an option to purchase 120,000 shares of Common Stock on the date such individual first becomes a non-employee director (the "Initial Grant"). The Initial Grant will vest annually over three years upon each anniversary of the date of appointment to the Board, subject to the non-employee director's continuous service.

- *Annual Grant.* On the date of each annual meeting of our stockholders, each non-employee director (other than any director receiving an Initial Grant on the date of such annual meeting) who is then serving as a non-employee director and who will continue as a non-employee director following the date of such annual meeting automatically will be granted an option to purchase 70,000 shares of Common Stock (the "Annual Grant"). The Annual Grant will vest 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, subject to the non-employee director's continuous service.
- *Exercise Price and Term of Options.* The exercise price of all options granted under the 2018 Plan is equal to the fair market value of a share of our Common Stock as determined under the 2018 Plan. Options granted under the 2018 Plan have a term of ten years from the date of grant, unless terminated earlier.
- *Exercise Period Post-Termination.* The options granted pursuant to the 2018 Plan remain exercisable until the earlier of the original expiration date of the option or 36 months following the optionee's termination of service as our non-employee director.

As noted above, under the Directors Market Value Plan, to the extent permitted by the Director Compensation Policy, the cash compensation payable to a non-employee director who has properly formally elected to receive such cash compensation instead in the form of shares of Common Stock will be used to purchase shares of Common Stock from Geron under the Directors Market Value Plan on the date that such cash compensation is payable to the non-employee director under the Director Compensation Policy.

Effect of Certain Corporate and Termination Events

2018 Plan. As set forth in each option agreement under the 2018 Plan, the vesting for each Initial Grant and Annual Grant will accelerate in full in the event of a Change in Control of Geron (as defined in the 2018 Plan and described below under the sub-section entitled "Potential Payments Upon Termination or Change in Control"). In addition, in the event a non-employee director experiences a termination of service as a result of such director's total and permanent disability (as defined in Section 22(e)(3) of the Internal Revenue Code of 1986, as amended (the "Code")) or death, the portion of each outstanding option held by such director that would have vested during the 36 months after the date of such director's termination of service, will automatically vest.

Option Grants to Non-Employee Directors in 2018

The following table sets forth the following information with respect to non-employee directors (six persons) for the fiscal year ended December 31, 2018: (i) stock options granted under the 2018 Plan; and (ii) the grant date fair value of stock options granted.

Non-Employee Director	Grant Date[3]	Option Awards Granted During 2018 (#)	Grant Date Fair Value of Option Awards Granted During 2018 ($)[1]
Bradbury, Daniel [2]	5/15/18	70,000	164,395
Eastham, Karin	5/15/18	70,000	164,395
Huh, Hoyoung [4]	5/15/18	70,000	164,395
Lawlis, V. Bryan	5/15/18	70,000	164,395
Molineaux, Susan	5/15/18	70,000	164,395
Spiegel, Robert	5/15/18	70,000	164,395

(1) Amounts represent the grant date fair value of each stock option granted in 2018 calculated in accordance with FASB ASC Topic 718. Refer to Note 7 of the financial statements in our Annual Report on Form 10-K for the year ended December 31, 2018 regarding assumptions underlying the valuation of stock option awards and the calculation method.

(2) In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Audit Committee and the Nominating and Corporate Governance Committee of the Company effective June 6, 2019, the date of the Annual Meeting.

(3) Stock option vests on the earlier of: (i) the date of the next annual meeting or (ii) the first anniversary of the date of grant of such option, subject to the non-employee director's continuous service to the Company.

(4) Effective December 26, 2018, Dr. Huh resigned from the Board for personal reasons.

Option Exercises in 2018

For the fiscal year ending December 31, 2018, Dr. Spiegel exercised options to purchase 175,000 shares of Common Stock and realized a value of $473,950 upon exercise. No other non-employee directors exercised any options in 2018.

Outstanding Equity Awards at Fiscal Year-End for Non-Employee Directors

The following table sets forth stock options outstanding for each non-employee director as of December 31, 2018.

	Option Awards Outstanding as of December 31, 2018	
Non-Employee Director	**Exercisable (#)**	**Unexercisable (#)**
Bradbury, Daniel [(1)]	275,000	70,000
Eastham, Karin	350,500	70,000
Huh, Hoyoung [(2)]	432,500	—
Lawlis, V. Bryan	310,000	70,000
Molineaux, Susan	275,000	70,000
Spiegel, Robert	135,000	70,000

(1) In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Audit Committee and the Nominating and Corporate Governance Committee of the Company effective June 6, 2019, the date of the Annual Meeting.

(2) Effective December 26, 2018, Dr. Huh resigned from the Board for personal reasons.

PROPOSAL 2

APPROVAL OF AN AMENDMENT TO OUR RESTATED CERTIFICATE OF INCORPORATION TO INCREASE THE TOTAL NUMBER OF AUTHORIZED SHARES OF COMMON STOCK

The Board has determined that it is in the Company's best interests and in the best interests of our stockholders to amend our Restated Certificate of Incorporation to increase our authorized number of shares of Common Stock from 300,000,000 shares to 450,000,000 shares. On January 30, 2019, the Board adopted resolutions approving the proposed amendment to our Restated Certificate of Incorporation, in substantially the form of Appendix 1 hereto. At that time, the Board declared the proposed amendment and increase of the Common Stock to be advisable and in the best interests of the Company and our stockholders and is accordingly submitting the proposed amendment and increase of the Common Stock for approval by our stockholders.

If stockholders approve this proposal, we expect to file the amendment to our Restated Certificate of Incorporation with the Secretary of State of the State of Delaware to increase the total number of authorized shares of our Common Stock as soon as practicable following stockholder approval. In this regard, upon filing of the amendment to our Restated Certificate of Incorporation with the Secretary of State of the State of Delaware, Section A of Article IV of the Restated Certificate of Incorporation would be amended as follows, with the proposed additions double-underlined and proposed deletions stricken through:

"(A) Class of Stock. The Corporation is authorized to issue two classes of stock to be designated, respectively, "Common Stock" and "Preferred Stock." The total number of shares which the Corporation is authorized to issue is ~~Three Hundred Three Million (303,000,000)~~Four Hundred Fifty-Three Million (453,000,000) shares. ~~Three Hundred Million (300,000,000)~~Four Hundred Fifty Million (450,000,000) shares shall be Common Stock, par value $0.001 per share, and Three Million (3,000,000) shares shall be Preferred Stock, par value $0.001 per share."

Of the 300,000,000 shares of our Common Stock currently authorized, as of the close of business on April 8, 2019, there were 186,456,047 shares of Common Stock issued and outstanding, which does not include the following:

- 32,126,384 shares of our Common Stock were issuable upon the exercise of options outstanding, having a weighted-average exercise price of $2.46 per share;
- 537,893 shares of our Common Stock were issuable upon the exercise of an outstanding warrant with an exercise price of $3.98 per share; and
- an aggregate of 12,890,010 shares of our Common Stock were reserved for future issuance under our 2014 Employee Stock Purchase Plan, the 2018 Plan, the Directors Market Value Plan, and 2018 Inducement Award Plan.

The proposed amendment to our Restated Certificate of Incorporation would increase the number of shares of Common Stock that we are authorized to issue from 300,000,000 shares of Common Stock to 450,000,000 shares of Common Stock, representing an increase of 150,000,000 shares of authorized Common Stock, with a corresponding increase in the total authorized capital stock, which includes Common Stock and Preferred Stock, from 303,000,000 shares to 453,000,000 shares.

Reasons for the Increase in Authorized Shares

To date, we have not derived any revenue from 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 early stage clinical trials of our sole product candidate, imetelstat, and past product candidates that we have subsequently discontinued, and engaging in research and development under collaboration agreements. 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. We have no credit facility or committed sources of capital. Until we can generate sufficient product revenues, if ever, we expect to finance future cash needs through public or private equity or equity-linked offerings, debt financings or collaboration and licensing arrangements (which arrangements can also involve the possibility of an equity investment).

As of the date of this proxy statement, the Board has no definitive plans, arrangements or understandings to issue any of the additional shares of Common Stock that would be available as a result of the approval of this Proposal 2, other than pursuant to our various employee and director equity plans and pursuant to our At Market Issuance Sales Agreement, or the Sales Agreement, with B. Riley FBR, Inc. under which we may elect to issue and sell shares of our Common Stock having an aggregate offering price of up to approximately $62.8 million as of the date of this proxy statement. While as of the date of this proxy statement we have sufficient authorized shares of Common Stock to effect sales under the Sales Agreement and to issue shares under our various employee and director equity plans, our Board believes it would be appropriate to have the additional shares available to provide additional flexibility to promptly and appropriately use our Common Stock for business and financial purposes in the future as well as to have sufficient shares available to provide appropriate equity incentives for our employees and other eligible service providers. The additional shares of Common Stock, if approved, may be used for various purposes without further stockholder approval. These purposes may include raising capital; providing equity incentives to employees, officers, directors, consultants and/or advisors; establishing licensing arrangements with other companies; expanding our business through the acquisition of other businesses, products or technologies; and other purposes.

For example, we will require substantial additional capital in order to continue to conduct the research and development and clinical and regulatory activities necessary to bring imetelstat to market, and to establish sales and marketing capabilities. Before imetelstat may be marketed and sold in the United States and in other countries, we must successfully conduct extensive clinical development of imetelstat at a substantial cost and obtain the requisite regulatory approvals, and we do not expect imetelstat to be commercially available for many years, if at all. In any event, successful drug development and commercialization requires significant amounts of capital that we do not currently have. Accordingly, if the Board determines that raising additional capital through issuing the additional shares of Common Stock is desirable, we want to be able to act quickly if market conditions are favorable. Given the number of shares of our Common Stock currently available for issuance, the Company might not be able to raise future capital without first obtaining stockholder approval for an increase in the number of authorized shares of Common Stock. The cost, prior notice requirements and delay involved in obtaining stockholder approval at the time that corporate action may be necessary or desirable could eliminate the Company's ability to opportunistically capitalize on market windows. In addition, our success depends in part on our continued ability to attract, retain and motivate highly qualified management and clinical personnel, and if this proposal is not approved by our stockholders, the lack of unissued and unreserved authorized shares of Common Stock to provide future equity incentive opportunities that the Compensation Committee deems appropriate could adversely impact our ability to achieve these goals. In summary, if stockholders do not approve this proposal, we may not be able to access the capital markets; continue to conduct the research and development and clinical and regulatory activities necessary to bring imetelstat to market; enter into licensing arrangements; attract, retain and motivate employees, officers, directors, consultants and/or advisors; and pursue other business opportunities integral to our growth and success, all of which could severely harm our business and our prospects.

The Board believes that the proposed increase in authorized Common Stock will make sufficient shares available to provide the additional flexibility necessary to pursue our strategic objectives. Over the past several

years, our authorized Common Stock has allowed us the flexibility to pursue a number of financing transactions that were key to enabling our support of the imetelstat program while at the same time enabling us to continue to provide the employee equity incentives that we deem necessary to attract and retain key employees. Unless stockholders approve this proposal, we may not have sufficient unissued and unreserved authorized shares of Common Stock to support the growth needed to continue the development of our sole product candidate, imetelstat, by engaging in similar transactions in the future, and to respond to compensatory needs by implementing new or revised equity compensation plans or arrangements, all of which could severely harm our business and our prospects.

Effects of the Increase in Authorized Shares

The additional Common Stock to be authorized by adoption of the amendment would have rights identical to the current outstanding Common Stock of the Company. Adoption of the proposed amendment and issuance of the Common Stock would not affect the rights of the holders of currently outstanding Common Stock, except for effects incidental to increasing the number of shares of the Common Stock outstanding, such as dilution of the earnings per share and voting rights of current holders of Common Stock. The additional shares of Common Stock authorized by the approval of this proposal could be issued by the Board without further vote of our stockholders except as may be required in particular cases by our Restated Certificate of Incorporation, applicable law, regulatory agencies or Nasdaq rules. Under our Restated Certificate of Incorporation, stockholders do not have preemptive rights to subscribe to additional securities that may be issued by us, which means that current stockholders do not have a prior right thereunder to purchase any new issue of Common Stock in order to maintain their proportionate ownership interests in the Company.

The increase in our authorized shares of Common Stock could also have an anti-takeover effect, in that additional shares could be issued (within the limits imposed by applicable law) in one or more transactions that could make a change in control or takeover of the Company difficult. For example, additional shares could be issued by us so as to dilute the stock ownership or voting rights of a person seeking to obtain control of the Company. Similarly, the issuance of additional shares to certain persons allied with our management could have the effect of making it more difficult to remove our management by diluting the stock ownership or voting rights of persons seeking to cause such removal. Although this proposal to approve the amendment of the Restated Certificate of Incorporation to increase the total number of authorized shares of Common Stock has been prompted by business and financial considerations and not by the threat of any hostile takeover attempt (nor is the Board currently aware of any such attempts directed at us), and the Board does not intend or view the proposed increase in the number of authorized shares of our Common Stock as an anti-takeover measure, stockholders should nevertheless be aware that approval of this proposal could facilitate future efforts by us to deter or prevent changes in control, including transactions in which our stockholders might otherwise receive a premium for their shares over then-current market prices.

Vote Required

The affirmative vote of the holders of a majority of outstanding shares of Common Stock will be required to approve this proposal. Abstentions will have the same effect as a vote against this proposal.

The Board of Directors Unanimously Recommends That Stockholders Vote <u>FOR</u> Proposal 2

PROPOSAL 3

ADVISORY VOTE TO APPROVE NAMED EXECUTIVE OFFICER COMPENSATION

As required by Section 951 of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Section 14A of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), the Board is requesting stockholders to vote, on a non-binding advisory basis, to approve the compensation paid to Geron's Named Executive Officers, as disclosed in this Proxy Statement. This proposal, commonly known as a "say-on-pay" proposal, gives stockholders the opportunity to express their views on the compensation of Geron's Named Executive Officers.

This vote is not intended to address any specific item of compensation, but rather the overall compensation of our Named Executive Officers and our executive compensation philosophy, policies and practices described in this Proxy Statement. The overall compensation of our Named Executive Officers subject to the vote is disclosed in this Proxy Statement in the sections entitled "Compensation Discussion and Analysis" and "Executive Compensation Tables and Related Narrative Disclosure."

The Compensation Committee continually reviews our executive compensation program to determine whether such program achieves our desired goals of aligning our executive compensation structure with the Company's stockholders' interests and current market practices. As discussed in detail in the section entitled "Compensation Discussion and Analysis" of this Proxy Statement, Geron's executive compensation strategy and structure is designed to motivate our executive team to create long-term value for our stockholders through the achievement of strategic business objectives, while effectively managing the risks and challenges inherent in a clinical-stage biotechnology company. As the long-term success of Geron depends on the talents of our employees, the compensation structure plays a significant role in our ability to attract, retain and motivate the highest quality workforce in a competitive employment environment in the San Francisco Bay Area while also promoting a high-performance culture. The Compensation Committee believes the emphasis on pay for performance in Geron's executive compensation program strongly aligns with the long-term interests of our stockholders. Please read the "Compensation Discussion and Analysis" section of this Proxy Statement for additional details about our executive compensation program, including information about the 2018 compensation of our Named Executive Officers.

Advisory Vote

We recommend stockholder approval of the 2018 compensation of our Named Executive Officers as disclosed in this Proxy Statement pursuant to the SEC's compensation disclosure rules, which disclosure includes the section entitled "Compensation Discussion and Analysis," and the compensation tables and accompanying narrative disclosures within the section entitled "Executive Compensation Tables and Related Narrative Disclosure" of this Proxy Statement.

Accordingly, the Board recommends that stockholders vote in favor of the following resolution:

"RESOLVED, that the stockholders approve, on a non-binding advisory basis, the compensation paid to Geron's Named Executive Officers, as disclosed in the Compensation Discussion and Analysis section, the tabular disclosure regarding such compensation and the accompanying narrative disclosure set forth in the Proxy Statement relating to the Company's 2019 Annual Meeting of Stockholders."

Approval of the above resolution requires the affirmative vote of the holders of a majority of the shares having voting power present in person or represented by proxy at the Annual Meeting. Abstentions will have the same effect as a vote against this proposal, and broker non-votes will have no effect on the outcome of this proposal.

As this is an advisory vote, the outcome of the vote is non-binding on us with respect to future executive officer compensation decisions, including those related to our Named Executive Officers, or otherwise. However, the Board and the Compensation Committee will review the results of the vote and take them into account when considering future executive officer compensation policies and decisions.

Unless the Board modifies its policy on the frequency of future advisory votes on the compensation of our Named Executive Officers, the next advisory vote on the compensation of our Named Executive Officers will be held at next year's annual meeting of stockholders.

The Board of Directors Unanimously Recommends
That Stockholders Vote FOR Proposal 3

COMPENSATION DISCUSSION AND ANALYSIS

This Compensation Discussion and Analysis section presents and discusses executive compensation policies and practices and the compensation decisions relating to our "Named Executive Officers" (as defined below) for the 2018 fiscal year, and includes the following:

- an executive summary of the business activities which influenced 2018 compensation decisions and important features of our executive compensation program;
- philosophy, objectives and key elements of our executive compensation program;
- process for setting executive compensation, including the role of the Compensation Committee, management and independent compensation consultant;
- a detailed discussion and analysis of the Compensation Committee's specific decisions about 2018 compensation for our Named Executive Officers; and
- a description of other compensation considerations and practices.

The following executive officers are collectively referred to herein as our Named Executive Officers:

- Dr. John A. Scarlett, President and Chief Executive Officer (also appointed Chairman of the Board as of December 27, 2018);
- Ms. Olivia K. Bloom, Executive Vice President, Finance, Chief Financial Officer and Treasurer;
- Ms. Melissa A. Kelly Behrs, Executive Vice President, Business Development and Portfolio & Alliance Management (appointed Executive Vice President and Chief Business Officer in January 2019);
- Dr. Andrew J. Grethlein, Executive Vice President, Development and Technical Operations (appointed Executive Vice President and Chief Operating Officer in January 2019); and
- Mr. Stephen N. Rosenfield, Executive Vice President, General Counsel and Corporate Secretary (appointed Executive Vice President, Chief Legal Officer and Corporate Secretary in January 2019).

Executive Summary

Business Highlights that Impacted 2018 Compensation Decisions

Executive compensation decisions for 2018 were highly influenced by retention challenges stemming from the significant uncertainty as to whether Janssen Biotech, Inc. ("Janssen") would decide to continue to maintain its license rights under the collaboration and license agreement (the "Collaboration Agreement"), and continue the development of imetelstat, or discontinue the development of imetelstat and terminate the Collaboration Agreement. We refer to this decision as the continuation decision, and the timing of the continuation decision was triggered by the completion of the primary analysis of the Phase 2 trial in

myelofibrosis, which occurred in the third quarter of 2018. Because either a positive or negative continuation decision by Janssen would have a substantial impact to our future operations and the potential long-term benefits that could be earned by our Named Executive Officers, we structured 2018 executive compensation with a particular focus on incentivizing our executives to position the Company well for either a positive or negative continuation decision by Janssen. Also, 2018 executive compensation was structured with the goal of retaining our current executive team, whose leadership was vital to maintaining continuity within the Company during the pendency of the continuation decision, and whose leadership remains vital as we transition the imetelstat program from Janssen, following their negative continuation decision and termination of the Collaboration Agreement, and prepare to advance imetelstat development on our own. In 2018, we faced additional executive retention challenges as the marketplace for qualified executive officers with broad experience in a small company environment continued to be highly competitive in the San Francisco Bay Area due in part to the robust growth in both the technology and biopharmaceutical industries as a result of numerous companies going public.

Our corporate goals for 2018 primarily focused on continuing a productive collaboration with Janssen to further the imetelstat program, and preparing clinical and commercial strategies to develop imetelstat on our own in the event of a negative continuation decision by Janssen. Also in 2018, our corporate goals focused on business development activities related to completing due diligence and conducting transaction negotiations for a potential acquisition candidate. The Compensation Committee and independent members of the Board (the "Independent Board"), evaluated our achievements in 2018 and determined that we achieved only 70% of our 2018 corporate goals due to the negative continuation decision by Janssen. For details regarding our 2018 corporate goal achievements, see the sub-section entitled "Compensation Discussion and Analysis – 2018 Corporate Goal Achievement Factor."

Important Features of Our Executive Compensation Program

The Compensation Committee has structured our executive compensation program to ensure that our Named Executive Officers are compensated in a manner consistent with stockholder interests, competitive pay practices and applicable requirements of regulatory bodies. The following are important features of the design and operation of our executive compensation program in 2018:

- *Emphasis on Pay for Performance.* A significant portion of our Named Executive Officers' total compensation is variable, at risk and tied directly to performance measured and assessed annually by our Compensation Committee and Independent Board. The annual performance-based bonuses and long-term incentive awards represent at-risk elements of compensation and comprise approximately 73% of the total compensation of our Chief Executive Officer, Dr. Scarlett, as reported in the "Summary Compensation Table." As in prior years, in 2018, Dr. Scarlett's annual performance-based bonus was entirely contingent upon the Company's percentage achievement of its corporate goals. The annual performance-based bonus for our other Named Executive Officers is also contingent upon the Company's percentage achievement of its corporate goals, in addition to each executive officer's level of achievement of his/her respective individual goals and demonstration of our corporate values. Our annual performance-based bonus plan does not entitle or guarantee any minimum bonuses to our Named Executive Officers, including our Chief Executive Officer, and none of our employment agreements with our Named Executive Officers, including our Chief Executive Officer, contain multi-year guarantees for salary increases, or non-performance based guaranteed bonuses or equity compensation.
- *Introduction of Performance-Vesting Equity Awards.* In November 2018, we granted performance-vesting stock options to our Named Executive Officers that vest upon achievement of strategic regulatory milestones that are critical to the successful development of imetelstat. These milestones are 1) the achievement of acceptance for review by the United States Food and Drug Administration (the "FDA") of a New Drug Application (an "NDA") for the first imetelstat indication and 2) the achievement of regulatory approval by the FDA of an NDA for the first imetelstat indication. These stock option awards serve special retention and incentive purposes as a result of Janssen's negative continuation decision, and complement the annual stock options we

also granted to our Named Executive Officers in January 2018, which provide value only if the market price of our Common Stock increases, and then only if the executive officer continues in our employment.

- *Clawback Terms.* Our executive officer employment agreements require that an executive officer forfeit his/her entire annual performance-based bonus if we determine that such executive officer has engaged in any misconduct intended to affect the payment of his/her annual performance-based bonus, or has otherwise engaged in any act or omission that would constitute cause for termination of his/her employment, as defined by his/her employment agreement.
- *No Tax Gross-Ups on Compensation.* None of our Named Executive Officers receive tax-related gross-ups on any element of compensation.
- *No Defined Retirement Benefits.* We do not offer any defined benefit pension plans or health benefits during retirement.
- *Limited Personal Benefits.* Our Named Executive Officers are generally eligible for the same benefits as non-executive, salaried employees, and do not receive any personal benefits, other than limited reimbursements for housing costs and travel expenses for our Chief Executive Officer, Dr. Scarlett, for the commute from his principal residence in Texas to our headquarters in Menlo Park, California.
- *No Hedging or Pledging.* Our Insider Trading Policy prohibits employees from engaging in speculative trading activities, including hedging or pledging company securities as collateral. Accordingly, our employees, including our Named Executive Officers, may not hedge the economic risk of, or pledge ownership of, our Common Stock.
- *Prohibition on Option Repricing.* Our equity plans do not permit repricing underwater stock options without stockholder approval, and we have not repriced stock options, despite a substantial portion of our executive officer's options being underwater.
- *Objective Compensation Program Oversight.* Our executive compensation program is administered by the Compensation Committee which is comprised entirely of independent non-employee directors.
- *Independent Compensation Consultant Advice.* The Compensation Committee engages, on an annual basis, an experienced, independent compensation consultant who reports directly to the Compensation Committee to advise on cash and equity executive compensation matters. In 2018, as in past years, the Compensation Committee engaged Radford, an Aon Hewitt Company, a subsidiary of Aon ("Radford"), to advise it on executive compensation.
- *Compensation Risk Management.* The Compensation Committee annually reviews our executive compensation program to ensure that the program design avoids inappropriate risk taking by our Named Executive Officers.

Effect of Stockholder Advisory Vote on Executive Compensation

At our 2018 Annual Meeting of Stockholders, we sought an advisory vote from our stockholders regarding the compensation of our named executive officers. The 2018 "say-on-pay" proposal was approved, with approximately 80.9% of the votes cast supporting the proposal. The Compensation Committee considers the results of the advisory vote as it completes its annual review of each pay element and the compensation packages provided to our Named Executive Officers. The Compensation Committee considered the outcome of the 2018 "say-on–pay" vote and did not make any changes to Geron's executive compensation program for 2018 as a result of the vote, however the Compensation Committee continues to monitor and evaluate our compensation program going forward in light of our stockholders' view and our evolving needs and business strategy.

Our Executive Compensation Program

Philosophy and Objectives

We believe that the leadership of our current executive team has been vital to maintaining continuity within the Company in 2018, due to the uncertainty arising from the pendency of the continuation decision by Janssen. Having such continuity amongst our executive team and the overall company is even more important in 2019 as we assume independent development of imetelstat and, if imetelstat is approved in the future by regulatory authorities in the United States, commercialize on our own. With the high demand in the marketplace for skilled biotechnology human resources in the San Francisco Bay Area, recruiting new executive officers with the institutional knowledge that is critical to efficiently and effectively resume imetelstat development, which our Named Executive Officers possess, would be difficult and inevitably delay future development and potential commercialization of the product candidate. In addition, our industry is highly scientific, clinical, regulated and dynamic, which requires an executive team that is exceptionally educated, dedicated and experienced. We also believe that the work of the Named Executive Officers toward accomplishment of our corporate goals is highly collaborative and team-oriented, requiring each Named Executive Officer to perform duties and responsibilities outside those of his or her job title, as such job titles are commonly understood in the industry. Given the highly collaborative teamwork of the Named Executive Officers and the benefit we believe is conveyed to the Company by retaining the team intact, the Compensation Committee has therefore determined that retention and internal pay equity among the executive team are key factors in compensation decisions. In light of these circumstances, we believe our executive compensation program serves to help attract, motivate and retain our Named Executive Officers to manage our business and create long-term stockholder value while recognizing the importance of linking rewards to performance and aligning the interests of stockholders and executive officers.

Our executive compensation program has the following general objectives:

- to pay appropriate cash and equity compensation to executive officers for retention purposes during periods of significant uncertainty and where the volatility of our business results in highly variable compensation during any given period;
- to attract and retain experienced executive officers by incentivizing them with competitive cash and non-cash compensation opportunities while allowing the Company to maintain a fiscally responsible position;
- to foster a pay for performance philosophy by rewarding executive officers only upon successful achievement of individual and corporate goals; and
- to align the interests of executive officers with stockholders by motivating executive officers to focus on effectively attaining key corporate strategic and financial objectives that will drive long-term stockholder value.

Components

The primary components of our executive compensation program consist of elements that are available to all employees, including base salary, annual performance-based bonuses, equity awards and broad-based benefits. To help retain and motivate our Named Executive Officers, we target total compensation that is competitive with the San Francisco Bay Area biotechnology employment market through the utilization of a mix of cash (base salaries and annual performance-based bonuses) and long-term incentives (equity awards). “Total compensation” referred to in this Compensation Discussion and Analysis consists of annual base salary, annual performance-based bonus and the grant date fair value of equity awards as reported in the sub-section entitled “Summary Compensation Table.”

Base Salary (Fixed Cash Compensation)

Base salaries provide financial stability and security through a fixed amount of cash for performing daily responsibilities. Generally, increases in base salary are made as a result of any one or more of the following: a) cost of living increases; b) comparisons to market data; c) changes in responsibilities or position; d) individual

performance during the past year; e) individual criticality to our future plans; and f) internal pay equity amongst our Named Executive Officers. Increases in base salary typically are effective as of January 1st of each calendar year. For further discussion of the evaluation of individual Named Executive Officer base salaries, see the sub-section entitled "2018 Base Salaries."

Annual Performance-Based Bonuses (At-Risk Cash Compensation)

Under our annual performance-based bonus plan, every employee, including each Named Executive Officer, has an established annual performance-based bonus target, which is equal to a percentage of the employee's base salary. This percentage increases as levels of responsibility and title increase. None of our Named Executive Officers, including our Chief Executive Officer, are entitled to guaranteed or minimum bonuses under our annual performance-based bonus plan.

The actual earned annual performance-based bonus for each employee (except the Chief Executive Officer), if any, is predicated on the: (1) level of achievement of annual corporate goals as approved by our Independent Board (the "corporate goal achievement factor"), (2) level of achievement of individual goals (the "individual performance factor") and (3) level of display of our corporate values (the "corporate values performance factor"). For more senior employees and our Named Executive Officers, the corporate goal achievement factor is weighted more heavily and thus has greater influence on the amount of an annual performance-based bonus that may be earned, as contributions from these individuals have a larger impact on corporate goal achievements. This practice is designed to create a direct link between executive compensation and achievement of strategic and financial objectives that will drive long-term stockholder value. Our Chief Executive Officer's actual earned annual performance-based bonus is based entirely upon the corporate goal achievement factor.

Our corporate values are authenticity, accountability, excellence, integrity and respect. Our corporate goals generally relate to strategic and financial objectives in support of our overall mission to develop and commercialize innovative therapeutics for hematology-oncology. As such, our corporate goals historically cover research, development and clinical activities; business development efforts to broaden our product candidate pipeline; operational, hiring and retention objectives; managing expenses and budget-related initiatives; improvements in or attainment of working capital levels, including financing targets; and implementation or completion of enterprise-level projects or processes.

Calculation of annual performance-based bonuses for all employees, including our Named Executive Officers, generally occurs at the beginning of each calendar year based on performance of the prior year. Payment of annual performance-based bonuses typically occurs in the first quarter of the calendar year. For further discussion of the annual performance review process and calculation of individual Named Executive Officer annual performance-based bonuses, see the sub-section entitled "2018 Annual Performance-Based Bonuses."

Long-Term Incentives (At-Risk Equity Compensation)

Long-term incentives (equity awards) are designed to align executive officers' interests with stockholder interests; promote retention through the reward of long-term Company performance; and encourage employee ownership in Geron. We primarily use stock option grants that are subject to monthly time-based vesting over four years under our 2018 Plan as equity awards. The Compensation Committee believes that the use of stock option grants:

- strongly aligns the interests of our executive officers with those of our stockholders by placing a considerable proportion of our executive officers' total compensation "at risk" because it is contingent on the appreciation in value of our Common Stock;
- supports our pay for performance philosophy by tying the value of their equity compensation to the achievement of specific and objective corporate goals that maximize long-term stockholder value;

- keeps the executive officers' total compensation opportunity competitive in comparison to market data, as equity awards are considered standard incentives in the San Francisco Bay Area biotechnology market; and
- encourages our executive officers to remain in the long-term employ of our Company.

While we have not adopted formal stock ownership or holding guidelines, our Named Executive Officers generally have held a substantial portion of the equity awards they have received, even long after the awards have vested, which helps to maintain the alignment between the interests of our Named Executive Officers and those of our stockholders over the longer term. For further discussion of the equity awards granted in 2018, see the sub-section entitled "2018 Equity Awards."

Broad-Based Benefits

Geron offers a comprehensive array of benefits to its employees, including our Named Executive Officers. These include:

- comprehensive medical, dental, vision coverage and life insurance;
- a "cafeteria" plan administered pursuant to Section 125 of the Code, which includes Geron's medical and dental insurance, medical reimbursement, and dependent care reimbursement plans;
- a 401(k) plan, which is a retirement savings defined contribution plan established in accordance with Section 401(a) of the Code (in 2018, we provided a fully vested employer matching contribution in cash equal to 50% of each employee's annual contributions); and
- an Employee Stock Purchase Plan, which is implemented and administered pursuant to Section 423 of the Code.

Executive officers pay for 30% of their health premium cost, which is deducted from their gross salary. Other employees pay either 16% or 25% of their health premium cost. We do not offer any defined benefit pension plans or health benefits during retirement.

Process for Setting Executive Compensation

Role of the Compensation Committee

Appointed by our Board, Compensation Committee members are independent of management and meet the Nasdaq listing standards for independence. The Compensation Committee acts on behalf of the Board to oversee the compensation policies and practices applicable to all our employees, including the administration of our equity plans and employee benefit plans. Typically, the Compensation Committee meets at least once quarterly and with greater frequency if necessary. The agenda for each meeting is usually developed by the Chair of the Compensation Committee, in consultation with the Chief Executive Officer, Executive Director of Human Resources, Chief Legal Officer and the independent compensation consultant, Radford. The Compensation Committee also meets in executive session without the presence of any employees. Historically, the Compensation Committee makes decisions related to executive compensation after conducting multiple meetings during the fourth quarter of the calendar year and the first quarter of the ensuing year.

Role of Independent Compensation Consultant

The Compensation Committee actively reviews and assesses our executive compensation program in light of the highly competitive employment environment in the San Francisco Bay Area, the challenges of recruiting, motivating and retaining our Named Executive Officers in an industry such as ours, which has much longer business cycles than other commercial industries, and evolving compensation governance and best practices. To assist with this assessment, the Compensation Committee has the authority to retain special counsel and other experts, including compensation consultants, to support their responsibilities in determining executive officer

compensation and related benefits. Since December 2011, the Compensation Committee has retained Radford as its independent compensation consultant due to its extensive analytical and compensation expertise in the biotechnology and pharmaceutical industry. Although the Company pays the costs of Radford's services, the Compensation Committee has the sole authority to engage and terminate Radford's services, as well as to approve their compensation. Radford makes recommendations to the Compensation Committee, but it has no authority to make compensation decisions on behalf of the Compensation Committee or the Company. The Compensation Committee, at its discretion, may communicate and meet with Radford with no Geron employees present.

In January 2018, the Compensation Committee reviewed information from Radford about potential conflicts of interest and analyzed whether the work of Radford as a compensation consultant raised any conflict of interest, taking into consideration the following six factors:

(i) the provision of other services to Geron by Radford or any other Aon Hewitt Company or its affiliates (collectively, the Radford Affiliates);

(ii) the amount of fees Geron paid to Radford or any Radford Affiliates as a percentage of the firm's total revenue;

(iii) Radford's policies and procedures that are designed to prevent conflicts of interest;

(iv) any business or personal relationship of Radford, any Radford Affiliates or the individual compensation advisors employed by Radford with an executive officer of the Company;

(v) any business or personal relationship of the individual compensation advisors employed by Radford with any member of the Compensation Committee; and

(vi) any Geron Common Stock owned by the individual compensation advisors employed by Radford.

Based on these factors, the Compensation Committee determined that there were no conflicts of interest with respect to the provision of services by Radford to the Compensation Committee. In 2018, fees paid to Radford for their services as a compensation consultant to the Compensation Committee amounted to less than 1.0% of Radford's total revenue for the same period and were less than $120,000. In January 2019, the Compensation Committee performed a similar analysis of Radford's independence, and determined that there were no conflicts of interest with respect to the provision of services by Radford to the Compensation Committee.

For 2018, Radford provided the following services to the Compensation Committee:

- reviewed emerging trends and topics regarding executive and non-employee director compensation;
- recommended the composition of companies for a defined peer group to reference in determining executive and non-employee director compensation;
- provided compensation data and practices related to executive officers and non-employee directors for the defined peer group based on data from SEC filings and Radford's Life Sciences Survey;
- conducted a competitive review of the compensation of our Named Executive Officers and non-employee directors, including advising on the design and structure of our equity awards;
- prepared an analysis of share usage under our equity incentive plan in comparison to the defined peer group based on data from SEC filings; and
- provided potential designs for a retention program based on performance for executive officers, after the Company assumed development of imetelstat on its own following the negative continuation decision from Janssen.

Role of Management

To aid the Compensation Committee in its responsibilities, during the first quarter of each year, the Chief Executive Officer, with assistance from the Chief Legal Officer and Executive Director of Human Resources, provides the Compensation Committee with recommendations relating to the level of achievement of our corporate goals. In addition, the Chief Executive Officer presents to the Compensation Committee written assessments of the performance and achievements, including support of our corporate values, for each of the Named Executive Officers (other than himself) for the prior year and recommends the individual performance factor and the corporate values performance factor for each executive officer (other than himself). The Compensation Committee gives considerable weight to the Chief Executive Officer's performance evaluations of the other Named Executive Officers, since he has direct knowledge of the criticality of their work, performance and contributions. The Compensation Committee does not consult with any other executive officer with regard to its decisions. The Compensation Committee reviews the individual performance factor and the corporate values performance factor for each of the Named Executive Officers (other than the Chief Executive Officer) and adjusts the factors as necessary prior to approval. The Chief Executive Officer does not participate in the Compensation Committee's or Board's deliberations or decisions with regard to his own compensation, which is approved by the Independent Board.

Use of Market Data and Peer Group Analysis

When considering executive compensation decisions, the Compensation Committee believes it is important to be informed as to current compensation practices of comparable publicly held companies in the life sciences industry, especially to understand the demand and competitiveness for attracting and retaining an individual with each Named Executive Officer's specific expertise and experience.

In November 2017, based on the recommendation of Radford, the Compensation Committee determined that a defined peer group was appropriate to reference in connection with making 2018 executive officer compensation decisions. With the assistance of Radford, the Compensation Committee considered several factors in determining the companies to be included in the defined peer group for 2018 executive compensation decisions, including stage of development, market capitalization, number of employees, public status and length of time being public, primary location of operations and level of research and development expenditures and revenue. The following companies were identified by the Compensation Committee as the defined peer group for 2018 executive compensation decisions:

Achillion Pharmaceuticals, Inc.	Cytokinetics, Incorporated	Sangamo Therapeutics, Inc.
Advaxis, Inc.	Idera Pharmaceuticals, Inc.	Stemline Therapeutics, Inc.
Atara Biotherapeutics	Iovance Biotherapeutics, Inc.	Syndax Pharmaceuticals, Inc.
BioTime, Inc.	La Jolla Pharmaceutical Company	TG Therapeutics, Inc.
Celldex Therapeutics, Inc.	MediciNova, Inc.	ZIOPHARM Oncology, Inc.
ChemoCentryx, Inc.	NewLink Genetics Corporation	
Curis, Inc.	Rigel Pharmaceuticals, Inc.	

As of January 2018, the average of the 30-day average market capitalization of these peer group companies was $464.3 million. These peer group companies had an average number of 82 full-time employees based on their most recent annual reports, compared to our 30-day average market capitalization of $303.2 million and 15 full-time employees. The market data supplied by Radford for the defined peer group provides information on the total compensation paid to executive officers in comparable positions and responsibilities. In 2018, as in prior years, the Compensation Committee believes referencing Radford's market data, along with other factors, is important to understand when setting total compensation for our Named Executive Officers because competition for executive management is intense in our industry and in our geographic area, and continued leadership from our Named Executive Officers is critical to our success. However, while referencing

the peer group compensation levels is helpful in determining market-competitive compensation for our Named Executive Officers, it is only one component in determining executive officer compensation, and the Compensation Committee has discretion in determining the nature and extent of its use.

Setting Base Salaries

The Compensation Committee (or the Independent Board with respect to the Chief Executive Officer, upon recommendation from the Compensation Committee), in consultation with Radford, sets base salaries for our Named Executive Officers when they join our Company or upon promotion. In addition, at the beginning of each calendar year, the Compensation Committee, in consultation with Radford, reviews and determines base salaries for our Named Executive Officers (or the Independent Board with respect to our Chief Executive Officer, upon recommendation from the Compensation Committee). The Compensation Committee (or the Independent Board with respect to our Chief Executive Officer, upon recommendation from the Compensation Committee) considers various factors in determining whether any base salary adjustments are necessary. These factors typically include an evaluation of each executive officer's position and specific responsibilities, individual performance, level of experience and criticality to our future plans, achievement of corporate and strategic goals, an analysis of compensation among other executive officers to maintain internal pay equity, and a review of competitive salary information, total compensation market data, and cost of living increases in the San Francisco Bay Area. The Compensation Committee does not apply any specific formulas in determining increases in base salaries for our Named Executive Officers.

Assessing Annual Corporate Performance

At the beginning of each calendar year, the Chief Executive Officer develops, with input from our Named Executive Officers, our corporate goals with recommended weightings for each goal. The weighting for each corporate goal depends on its importance and business value for Geron and our stockholders. The Chief Executive Officer submits the corporate goals and recommended weightings to the Compensation Committee and the Independent Board for their review and approval. The Compensation Committee and Independent Board review the corporate goals and weightings and modify them as necessary prior to approval.

During the first quarter of the year, as part of the annual year-end performance review process, the Compensation Committee evaluates our achievement of the corporate goals for the preceding year. To aid the Compensation Committee in its responsibilities, the Chief Executive Officer, with assistance from the Chief Legal Officer and Executive Director of Human Resources, provides the Compensation Committee with recommendations relating to the achievement of our annual corporate goals, known as the corporate goal achievement factor. The Compensation Committee does not use a rigid formula to determine the corporate goal achievement factor, and to date, has not established a minimum threshold or maximum value that may be potentially realized for the corporate goal achievement factor. The corporate goal achievement factor generally ranges from 0 to 1.0. The Compensation Committee evaluates the corporate goal achievement factor, and recommends the corporate goal achievement factor to the Independent Board, which has the final approval. To evaluate the corporate goal achievement factor, the Compensation Committee and Independent Board consider the following:

- the degree of success in achieving each corporate goal;
- the degree of difficulty in achieving the corporate goal;
- whether significant unforeseen obstacles or favorable circumstances altered the expected difficulty of achieving the desired results;
- other conditions that may have made the stated goal more or less important to our success; and
- any other significant company accomplishments not included in the formal goals, but nonetheless deemed important to our near- and long-term success.

The Compensation Committee recommends the corporate goal achievement factor to the Independent Board, which considers the recommendation of the Compensation Committee and may accept or modify such recommendation before approval. The Independent Board has the discretion to approve a corporate goal achievement factor above 1.0 in extraordinary circumstances where it determines such an increase is warranted.

Determining Equity Grants

The Compensation Committee (or the Independent Board with respect to our Chief Executive Officer, upon recommendation from the Compensation Committee), in consultation with Radford, determines the size of any stock option grant according to each executive officer's position. To do so, the Compensation Committee considers numerous factors and has the discretion to give relative weight to each of these factors as it sets the size of the stock option grant to appropriately create an opportunity for reward based on increasing stockholder value. There is no set formula for the granting of stock options or other equity awards to employees, including our Named Executive Officers. For further discussion of the process in determining stock option grants to our Named Executive Officers in 2018, see the sub-section entitled "2018 Equity Awards."

Equity Grant Practices

Our general policy is to grant stock options and other equity awards on fixed dates determined in advance. All required approvals are obtained in advance of or on the actual grant date. The exercise price of all stock option grants, including to executive officers, is equal to the closing price of Geron Common Stock as reported by the Nasdaq Global Select Market on the date of grant. Geron's standard vesting schedule for the first stock option grant awarded to newly hired employees, including executive officers, provides that 12.5% of the shares granted will vest six months after the vesting commencement date of the grant, and the remaining shares will vest in equal monthly installments over the following 42 months, so that vesting is complete four years from the date of grant, provided the employee continues to provide services to the Company during that time. Additional option grants made after an employee, including an executive officer, has provided services to the Company for more than six months generally vest monthly from the date of grant over four years.

The Compensation Committee (or the Independent Board with respect to our Chief Executive Officer, upon recommendation from the Compensation Committee) grants equity awards to newly hired and existing executive officers. Other than stock option grants to new hires or special awards for retention or other purposes, stock option grants to all employees, including executive officers, are generally approved once a year (typically near the beginning of the year). If an executive officer is promoted, an equity award grant will normally be made at the time of such promotion, or, in rare circumstances, for recognition of outstanding performance.

We recognize that a release of information in close proximity to an equity award grant may appear to be an effort to time the announcement to a grantee's benefit (even if no such benefit was intended). Accordingly, we have a general practice whereby if the Compensation Committee (or the Independent Board, in the case of the Chief Executive Officer) approves annual equity awards to our executive officers (and other employees) when our trading window is closed, then such annual equity awards will be granted on the second trading day following our trading window re-opening. This practice is intended to allow the market to absorb the undisclosed financial and other information that resulted in the closure of the trading window, so the market price of our Common Stock reflects our then-current results and prospects at the time the annual equity award is granted and the exercise price is set. As a result, the timing of annual equity awards to our continuing executive officers is not coordinated in a manner that intentionally benefits our executive officers.

Allocating Amongst Compensation Components

The Compensation Committee does not have any formal policies for allocating total compensation among the various components of the executive compensation program. Instead, the Compensation Committee uses its judgment, in consultation with Radford, to establish a mix of current, short-term and long-term incentive compensation, and cash and equity compensation for each Named Executive Officer. In setting the annual level of total compensation for our Named Executive Officers, the Compensation Committee considers various factors, which typically include:

- defined peer group market data provided by Radford;
- corporate performance, including current business challenges;
- our level of achievement of our corporate goals;
- internal pay equity among Named Executive Officers;
- each executive officer's individual performance;
- the criticality of each executive officer's skill set, and the need to retain such skills;
- executive officer stock ownership information;
- analyses of historical executive officer compensation levels and current company-wide compensation levels; and
- trends for executive compensation for our industry.

Each of these factors is considered in the context of our overall pay philosophy and balanced against Geron's financial resources and ability to award cash and equity incentives.

Compensation Decisions in 2018

2018 Base Salaries

The Compensation Committee believes base salaries should be consistent with the base salaries provided by companies in our defined peer group. In January 2018, the Compensation Committee performed its annual analysis of base salaries for all of our Named Executive Officers using the defined peer group market data provided by Radford. The market data analysis showed that at the end of 2017, the base salary of four of our Named Executive Officers was at or above the 75th percentile of the defined peer group market data provided by Radford, and the base salary of Ms. Bloom was at the 50th percentile of the defined peer group market data provided by Radford. The Compensation Committee concluded, with respect to each Named Executive Officer whose base salary was at or above the 75th percentile of the defined peer group market data provided by Radford, that such base salary appropriately reflected the broad responsibilities of each Named Executive Officer and the level of difficulty required to achieve the individual and corporate goals for 2018. In addition to the market data analysis, the Compensation Committee considered a number of other factors, including:

- the individual performance of each Named Executive Officer in 2017;
- internal pay equity among the Named Executive Officers;
- tenure, experience, skills and responsibilities of each Named Executive Officer;
- managerial leadership exhibited by each Named Executive Officer;
- expected cost of living increases in the San Francisco Bay Area;
- overall Company performance; and
- the anticipated level of difficulty in replacing an executive officer with someone of comparable experience and skill, especially given significant uncertainty relating to our future operations.

Given the collaborative team-oriented effort and broad job responsibilities of our Named Executive Officers, and therefore, the desire for internal pay equity among the executive team, and based on guidance provided by Radford as to an appropriate cost of living adjustment, the Compensation Committee and, with respect to Dr. Scarlett, the Independent Board, approved a cost of living base salary adjustment up to 4.0% for four of our Named Executive Officers for 2018. The Compensation Committee adjusted the base salary of Ms. Bloom by 8.5% to be in line with the 75th percentile of the defined peer group market data provided by Radford, as her pay lagged market data more than the other Named Executive Officers. In reaching this decision, the Compensation Committee considered the breadth of Ms. Bloom's responsibilities, the thorough manner in which all of those responsibilities are fulfilled by Ms. Bloom, the desire to maintain internal pay equity among the other Named Executive Officers and the local market competitiveness for public company finance executives.

The following 2018 base salaries for our Named Executive Officers were effective as of January 1, 2018.

Named Executive Officer	2017 Base Salary	Salary Increase (%)	2018 Base Salary
John A. Scarlett, M.D.	$ 644,000	3.6%	$ 667,000
Olivia K. Bloom	$ 410,000	8.5%	$ 445,000
Melissa A. Kelly Behrs	$ 386,500	3.5%	$ 400,000
Andrew J. Grethlein, Ph.D.	$ 416,200	3.3%	$ 430,000
Stephen N. Rosenfield, J.D.	$ 428,300 (1)	3.9%	$ 445,000 (1)

(1) We employ Mr. Rosenfield at 80% full-time equivalent. Thus, the actual base salary paid to Mr. Rosenfield is 80% of the amounts presented in the table.

2018 Annual Performance-Based Bonuses

Named Executive Officers' 2018 annual performance-based bonus targets, as a percentage of base salary, as shown in the table below, remained at the same historical levels that we have applied since 2010. The defined peer group market data provided by Radford showed that the annual performance-based bonus targets for each of our Named Executive Officers in 2018 were at or above the 75th percentile of the defined peer group data provided by Radford. The Compensation Committee determined that these annual performance-based targets were appropriate for 2018 in light of the functions for which our Named Executive Officers were accountable to ensure achievement of our 2018 corporate goals, and strengthened our ability to retain our Named Executive Officers in a competitive job market.

The table below summarizes the annual performance-based bonus targets as a percentage of annual salary for each of our Named Executive Officers for 2018.

Named Executive Officer	Annual Incentive Bonus Target as a % of Salary
John A. Scarlett, M.D.	60%
Olivia K. Bloom	45%
Melissa A. Kelly Behrs	45%
Andrew J. Grethlein, Ph.D.	45%
Stephen N. Rosenfield, J.D.	45%

In keeping with of our pay for performance philosophy, the amount of an annual performance-based bonus that can be earned by each Named Executive Officer is variable and at risk due to its dependency on the performance of the individual and the overall Company. Consistent with prior years, for 2018, other than Dr. Scarlett, each Named Executive Officer's annual performance-based bonus was contingent on the following: 50% upon the level of achievement of our corporate goals, 30% upon the level of achievement of individual goals, and 20% upon individual support and manifestation of our corporate values. Dr. Scarlett's annual performance-based bonus was 100% contingent upon the level of achievement of our corporate goals.

2018 Corporate Goal Achievement Factor

The table below summarizes the corporate goals approved by the Independent Board for 2018, including assigned weightings, and the Compensation Committee's and Independent Board's assessment of the level of achievement of those goals for 2018. The corporate goals for 2018 primarily focused on continuing a productive collaboration with Janssen to further the imetelstat program, and preparing clinical and commercial strategies to develop imetelstat on our own in the event of a potential negative continuation decision by Janssen. Also in 2018, our corporate goals focused on business development activities related to completing due diligence and transaction negotiations for a potential acquisition candidate. Based on the achievements noted below and given the negative continuation decision by Janssen and termination of the Collaboration Agreement, the Independent Board deemed these corporate goals to be 70% achieved in 2018.

2018 Corporate Goals	Weighting (A)	Highlights of Company Performance	Percent Achieved (B)	Total (A x B)
1) Achieve continued development of imetelstat by Janssen	30%	• Janssen provided a negative continuation decision and terminated the Collaboration Agreement effective September 28, 2018 as the result of a strategic portfolio evaluation and prioritization of assets within their portfolio.	0%	0%
2) Actively engage Janssen in program oversight and joint decision making	10%	In 2018, our collaborative activities with Janssen for the imetelstat program encompassed the following: • Active participation in numerous steering committee and working group meetings monitoring all aspects of the imetelstat development program, including clinical operations, regulatory interactions, manufacturing activities, preclinical research, medical affairs, commercial planning, external communications, intellectual property protection and financial reporting. • Review of information from the primary analysis for the Phase 2 clinical trial in myelofibrosis (IMbark) and the data snapshot for the Phase 2 portion of the clinical trial in lower risk MDS (IMerge). • Review of regulatory filings made by Janssen related to imetelstat. • Review and approval of publication requests from Janssen and other authors, including the oral presentation of IMerge Phase 2 data at the European Hematology Association annual meeting in June 2018. • Management of ongoing intellectual property protection for imetelstat.	100%	10%

2018 Corporate Goals	Weighting (A)	Highlights of Company Performance	Percent Achieved (B)	Total (A x B)
3) Complete U.S. quantitative market research with revenue forecast for imetelstat in lower risk MDS.	5%	• We engaged a nationally-recognized market research company to conduct an independent opportunity assessment for imetelstat in lower risk MDS. • We participated in the development of surveys to quantify and project the potential usage of imetelstat by hematologist oncologists in the U.S., Canada and Europe (quantitative surveys). • We reviewed data gathered from quantitative surveys to develop appropriate assumptions in forecasting potential revenue for imetelstat in lower risk MDS. • We summarized the feedback from the quantitative surveys and the calculation of forecasted revenues for presentation to the Board.	100%	5%
4) Establish program transition plan in the event of a potential negative continuation decision.	15%	• We engaged a global clinical research organization (CRO) and multiple consultants to establish a multi-disciplinary team alongside internal personnel to develop clinical plans for imetelstat in lower risk MDS, including approaches to efficiently and effectively undertake oversight of global clinical operations, regulatory affairs, manufacturing, pharmacovigilance, biostatistics and quality systems in the event of a potential negative continuation decision from Janssen. • We presented our proposed plans to the Board.	100%	15%
5) Develop commercial and/or partnering strategy for imetelstat in lower risk MDS.	10%	• We analyzed the operational and financial implications of multiple commercial and/or partnering strategies for imetelstat in the event of a potential negative continuation decision from Janssen. • We also analyzed the preferred timing for engaging in potential partnering discussions to maximize imetelstat's value in possible deal terms. • We identified minimum criteria for potential commercialization partners. • We proposed a commercial and partnering strategy to the Board whereby we would seek to establish internal capability and infrastructure to commercialize imetelstat in the United States and seek a partner for ex-U.S. commercialization rights. • We also presented to the Board our potential corporate development activities in 2019 to support our proposed strategy in the event of a potential negative continuation decision from Janssen.	100%	10%

2018 Corporate Goals	Weighting (A)	Highlights of Company Performance	Percent Achieved (B)	Total (A x B)
6) Complete due diligence and transaction negotiations with potential acquisition candidate.	10%	• At the end of 2017, we had identified a potential company to acquire to expand our pipeline. • In 2018, we conducted in-depth scientific, clinical, financial, legal and intellectual property due diligence, as well as advanced negotiations of potential terms for an acquisition by Geron. • The length of time to complete the acquisition and the proximity of the Janssen decision did not support moving forward with the acquisition in 2018 and further negotiations and due diligence ceased. • We presented our proposal to stop further negotiations and due diligence to the Board.	100%	10%
7) Manage expenditures to Board-approved budget.	5%	• We controlled expenses to be in line with established budget, maintaining sufficient cash resources to support business development activities, contingency planning efforts and collaborative development of imetelstat.	100%	5%
8) Complete financial and strategic assessment of imetelstat program under different Janssen scenarios.	15%	• We assessed various indications to be potentially developed for imetelstat. Such assessments quantified projected development costs and revenues, as well as timing of potential approval in an indication and the required financings to support such development. • These assessments also evaluated the impact of potential market competition and the costs and benefits of investing further in imetelstat versus finding new product candidates. • We presented our findings and conclusions to the Board.	100%	15%
Total	100%			70%

2018 Individual Performance and Corporate Values Performance Factors

As discussed in further detail below, each Named Executive Officer's 2018 individual performance factor was assessed not only in light of personal performance in accomplishing individual, team, departmental and functional goals and objectives, but also the overall performance of the functional areas for which the executive officer has responsibility, the manner in which the executive officer contributes to the overall success of the Company, including areas outside of his or her responsibility, and the overall management of the executive officer's staff. Each Named Executive Officer's individual corporate values performance factor was based on actions during 2018 demonstrating his or her full support and manifestation of our corporate values. Using the evaluations conducted by the Chief Executive Officer, the Compensation Committee determined the actual individual performance factor for each of our Named Executive Officers (other than the Chief Executive Officer) for 2018 to be either 1.25 or 1.30 and the actual corporate values performance factor to be 1.0.

2018 Individual Achievements

Consistent with prior years, Dr. Scarlett's 2018 annual performance-based bonus was structured to be 100% contingent on the level of corporate goal achievement. Accordingly, with the Independent Board approval

of the corporate goal achievement factor of 70% and Dr. Scarlett's direct responsibility and contributions for the achievement of such goals, the Compensation Committee recommended, and the Independent Board approved that Dr. Scarlett should receive 70% of his 2018 target annual performance-based bonus.

Ms. Bloom was awarded an individual performance factor of 1.25 and a corporate values performance factor of 1.0 based on the achievements and contributions made by Ms. Bloom during 2018, including in particular:

- supervised and controlled the Accounting/Finance function to ensure compliance with SEC, Nasdaq and PCAOB requirements, including maintenance of internal control over financial reporting, as well as directing the development of new systems in the event imetelstat development resumed wholly at Geron following a negative continuation decision from Janssen;
- effectively reviewed and negotiated company expenses to remain within the budgeted spending level for 2018, including calculating projections of increases in spending upon a potential negative continuation decision from Janssen;
- facilitated capital raising efforts by directing new shelf registration statement filing and negotiation of new At-Market (ATM) financing facility with reduced transaction fees; managed usage of ATM to raise additional capital in support of either a position or negative continuation decision from Janssen;
- directed and managed the Investor Relations function during internal turnover despite uncertainty surrounding Janssen decision-making and identified alternate resource to handle retail investor inquiries;
- supported business development efforts by performing financial and corporate governance due diligence on potential acquisition candidate and initiated building potential infrastructure to manage financial compliance and reporting on a timely basis post-acquisition; and
- guided the communications working group with Janssen to develop and implement a communications plan upon a decision by Janssen that aligned public disclosure timelines and messaging amongst various stakeholders.

Ms. Behrs was awarded an individual performance factor of 1.3 and a corporate values performance factor of 1.0 based on the achievements and contributions made by Ms. Behrs during 2018, including in particular:

- played key leadership role as a member of the imetelstat governance committees with Janssen, fostering a close, collaborative and high-quality alliance with Janssen, which continues today through numerous working groups to manage the imetelstat program transition;
- led the efforts for conducting an independent quantitative market research study of imetelstat in lower risk MDS, including developing quantitative surveys; assessing feedback from those surveys; and evaluating and pressure-testing assumptions in revenue forecasts;
- led the business development efforts in the negotiation and preparation of a definitive agreement for a potential transaction with an acquisition candidate;
- developed potential commercial and partnering strategies for imetelstat in the event of negative continuation decision from Janssen, and
- provided significant contributions to the business and financial analyses of imetelstat's value under either positive or negative continuation decision scenarios in order to support sound strategic decision making.

Dr. Grethlein was awarded an individual performance factor of 1.3 and a corporate values performance factor of 1.0 based on the achievements and contributions made by Dr. Grethlein during 2018, including in particular:

- led the selection of a CRO and multiple consultants to form a multi-disciplinary team to develop clinical development plans for imetelstat in lower risk MDS in the event of a potential negative continuation decision from Janssen; such plans included feasible approaches to efficiently and effectively undertake oversight of global clinical operations, regulatory affairs, manufacturing, pharmacovigilance, biostatistics and quality systems;
- played a key leadership role as a member of the imetelstat governance committees with Jansen in connection with clinical assessment of information from the primary analysis of IMbark and the data snapshot from the Phase 2 portion of IMerge;
- led the technical due diligence efforts of an acquisition candidate through engagement of target company's scientific team and directed technical experts to evaluate prospective clinical applications for each of the lead programs and technology platform and the possible competitive landscapes; and
- served as central technical and operational lead for program transition activities, including managing our external team comprised of our CRO and consultants and directing three-way interactions amongst Janssen, Geron and our external team.

Mr. Rosenfield was awarded an individual performance factor of 1.25 and a corporate values performance factor of 1.0 based on the following achievements and contributions made by Mr. Rosenfield during 2018, including in particular:

- served as a strategic business advisor to management and the Board by providing critical legal and business expertise in evaluating viability of acquisition candidate and possible business plans for imetelstat under positive or negative continuation decision scenarios;
- led and managed corporate governance compliance through administration of meetings of the Board and the Compensation Committee and Nominating and Corporate Governance Committee, including drafting of minutes and agendas and overseeing Board and committee self-evaluations;
- performed comprehensive and timely review of all public disclosure documents, including SEC filings, press releases, investor and business development presentations and conference call scripts, for completeness, accuracy and comprehension;
- supervised the Human Resources function, including review and analysis of compensation elements for employees and non-employee directors to ensure competitiveness in the biotechnology industry for the San Francisco Bay Area marketplace and development of an employee retention program following the negative continuation decision from Janssen; and
- supervised the Legal function, including overseeing imetelstat intellectual property protection under the Janssen collaboration, and managing the drafting of a definitive agreement for a potential transaction with an acquisition candidate.

Following are the annual performance-based bonus targets and weighting percentages for each of the factors used to calculate the 2018 annual performance-based bonus for each of our Named Executive Officers as well as the 2018 actual bonus percentage awarded.

Named Executive Officer	(A) Annual Incentive Bonus Target as a % of Salary	(B) Corporate Goal Achievement Weighting	(C) 2018 Corporate Goal Achievement Factor	(D) Individual Performance Weighting	(E) 2018 Individual Performance Factor	(F) Corporate Values Weighting	(G) 2018 Corporate Values Performance Factor	= (A*B*C) + (A*D*E) + (A*F*G) Annual Incentive Bonus Awarded as a % of Salary
John A. Scarlett, M.D.	60%	100%	0.7	N/A	N/A	N/A	N/A	42.0%
Olivia K. Bloom.....	45%	50%	0.7	30%	1.25	20%	1.0	41.6%
Melissa A. Kelly Behrs.....	45%	50%	0.7	30%	1.30	20%	1.0	42.3%
Andrew J. Grethlein, Ph.D.....	45%	50%	0.7	30%	1.30	20%	1.0	42.3%
Stephen N. Rosenfield, J.D.....	45%	50%	0.7	30%	1.25	20%	1.0	41.6%

2018 Equity Awards

Annual Option Grant

Consistent with the objectives of our executive compensation program to link pay with performance, align the interests of stockholders and employees, and encourage employee ownership in Geron, in January 2018, the Compensation Committee (or the Independent Board with respect to our Chief Executive Officer) approved stock option grants to our Named Executive Officers. In determining the appropriate size and value of stock option grants in January 2018 for our Named Executive Officers, the Compensation Committee (or the Independent Board with respect to our Chief Executive Officer) considered the following for each Named Executive Officer:

- overall corporate performance in the prior year;
- a Named Executive Officer's recent performance history and his or her potential for future responsibility;
- internal pay equity among the Named Executive Officers;
- criticality of the individual to the long-term success of the Company;
- equity awards previously granted to the individual;
- the amount of actual versus theoretical equity value per year that has been derived to date by the individual;
- the current actual value of unvested equity grants for each individual;
- the percentage of stock option grants with exercise prices greater than Geron's current stock price; and
- the number of stock option grants that have expired unexercised as a result of market conditions.

In addition to the above factors, the Compensation Committee (or the Independent Board with respect to our Chief Executive Officer) generally referenced the defined peer group market data provided by Radford and determined that in 2018 referencing the 50th to 75th percentile of the defined peer group market data provided by Radford for total compensation (consisting of annual base salary, annual performance-based bonus and the grant date fair value of equity awards) was appropriate for determining the level of stock option grants for our Named Executive Officers. Also, the Compensation Committee chose a broad-based approach in determining the level of stock option grants for our Named Executive Officers to maintain internal pay equity among the executive team and reflected the collaborative, team-oriented nature of the group. The Compensation

Committee increased the stock option grant for the Chief Financial Officer to be in line with the 50th percentile of the defined peer group market data provided by Radford.

The Compensation Committee (and the Independent Board with respect to the Chief Executive Officer, upon recommendation from the Compensation Committee) also determined that the equity awards granted to our Named Executive Officers in 2018 should continue to consist only of stock options, rather than restricted stock awards that vest over time, because stock options deliver future value only if the price per share of our Common Stock increases above the exercise price, thus aligning the interests of our Named Executive Officers and stockholders for the long-term success of Geron.

Our Named Executive Officers received the following stock option grants in January 2018:

Named Executive Officer	January 2018 Stock Option Grant (# of shares)
John A. Scarlett, M.D.	1,050,000
Olivia K. Bloom	350,000
Melissa A. Kelly Behrs	300,000
Andrew J. Grethlein, Ph.D.	300,000
Stephen N. Rosenfield, J.D.	300,000

In accordance with Geron's equity grant practices, the exercise price for the January 2018 stock option grants was equal to the closing price of Geron Common Stock as reported by the Nasdaq Global Select Market on the date of grant and the vesting schedule is monthly over four years from the date of grant, provided the employee continues to provide services to Geron. For additional information regarding stock option grants to our Named Executive Officers in 2018, see the sub-section entitled "Grants of Plan-Based Awards for 2018." We did not reprice any stock options in 2018, despite the fact that our Named Executive Officers hold a significant number of stock options that are underwater.

Performance-Vesting Retention Option Grant

Following the negative continuation decision by Janssen, in November 2018, the Compensation Committee engaged Radford to propose a performance-based program to retain our executive officers as the Company assumed independent development of imetelstat. Based on Radford's recommendation, which took into consideration potential retention value and corporate governance matters, the Compensation Committee (and the Independent Board with respect to the Chief Executive Officer, upon recommendation from the Compensation Committee), granted the following stock options to each of the Named Executive Officers. In sizing the award amounts, the Compensation Committee, with market data from Radford, considered the value that each of the Named Executive Officers could receive in a new employment situation. With this information, the Compensation Committee (and the Independent Board with respect to the Chief Executive Officer, upon recommendation from the Compensation Committee) determined the size of the stock option grant to be equivalent to a stock option grant for a newly hired executive officer, which the Compensation Committee (and the Independent Board with respect to the Chief Executive Officer) felt was necessary and appropriate to retain each of our Named Executive Officers and incentivize them to meet key strategic milestones. To promote longer-term retention, the Compensation Committee selected two vesting tranches for these stock options that require the achievement of critical strategic regulatory milestones that would enhance the development of imetelstat. See description of the milestones below.

Named Executive Officer	2018 Retention Stock Option Grant A [1] (# of shares)	2018 Retention Stock Option Grant B [2] (# of shares)
John A. Scarlett, M.D.	500,000	1,000,000
Olivia K. Bloom	250,000	500,000
Melissa A. Kelly Behrs	250,000	500,000
Andrew J. Grethlein, Ph.D.	250,000	500,000
Stephen N. Rosenfield, J.D.	250,000	500,000

(1) Retention Stock Option Grant A vests fully and becomes exercisable upon written certification by the Compensation Committee of the achievement of acceptance for review by the FDA of an NDA for the first imetelstat indication.

(2) Retention Stock Option Grant B vests fully and becomes exercisable upon written certification by the Compensation Committee of the achievement of regulatory approval by the FDA of an NDA for the first imetelstat indication.

In accordance with Geron's equity grant practices, the exercise price for the November 2018 retention stock option grants was equal to the closing price of Geron Common Stock as reported by the Nasdaq Global Select Market on the date of grant, November 7, 2018. For additional information regarding stock option grants to our Named Executive Officers in 2018, see the sub-section entitled "Grants of Plan-Based Awards for 2018."

2018 Perquisites

Dr. Scarlett received reimbursement for housing expenses (not to exceed $4,000 per month) and travel costs (not to exceed $20,000 per year) in connection with the commute from his personal residence in Texas to our headquarters in Menlo Park, California in 2018. These commuting expense benefits were negotiated with Dr. Scarlett at the time of his initial employment and were deemed a reasonable expense and necessary inducement to his commencement of employment with us. Dr. Scarlett does not receive separate compensation for serving as a member of our Board. As noted above, executive officers pay for 30% of their health premium cost, which is deducted from their gross salary and we pay the remaining portion.

Employment Agreements and Severance and Change in Control Benefits

We have entered into written employment agreements with each of our Named Executive Officers that set forth the terms of their employment, including initial base salaries, and eligibility to participate in the Company's annual performance-based bonus program. In addition, each employment agreement includes restrictive covenants, such as non-compete and non-solicitation provisions, that would apply in the event of termination, which our Board believe helps protect our value. Each of our Named Executive Officers is employed "at will."

Our Named Executive Officers are entitled to certain severance and change in control benefits under the terms of our Amended Severance Plan, their employment agreements and our equity plans, as further described under the sub-section entitled "Potential Payments Upon Termination or Change in Control." Given the nature of the life sciences industry and the range of strategic initiatives we may explore, the Compensation Committee believes these severance and change in control provisions are essential elements of our executive compensation program and assist us in recruiting, retaining and developing key management talent in the competitive San Francisco Bay Area employment market. Our change in control benefits are intended to allow employees, including our Named Executive Officers, to focus their attention on the business operations of Geron in the face of the potentially disruptive impact of a rumored or actual change in control transaction, to assess takeover bids objectively without regard to the potential impact on their own job security and to allow for a smooth transition in the event of a change in control of Geron. In addition, our severance benefits provide reasonable protection to the executive officer in the event that he or she is not retained. We do not provide for any excise tax gross-ups in the Amended Severance Plan or in any individual employment agreement with a Named Executive Officer.

Compensation Recovery Provisions

Each of our executive officer employment agreements contain a "clawback provision" which requires that an executive officer forfeit his or her entire annual performance-based bonus if we determine that such executive officer has engaged in any misconduct intended to affect the payment of his or her annual performance-based bonus, or has otherwise engaged in any act or omission that would constitute cause for termination of his or her employment, as defined by his or her employment agreement.

Tax and Accounting Implications of Executive Compensation

Under Section 162(m) of the Code ("Section 162(m)"), compensation paid to any publicly held corporation's "covered employees" that exceeds $1 million per taxable year for any covered employee is generally non-deductible. Prior to the enactment of the Tax Cuts and Jobs Act, Section 162(m) provided a performance-based compensation exception, pursuant to which the deduction limit under Section 162(m) did not apply to any compensation that qualified as "performance-based compensation" under Section 162(m). Pursuant to the Tax Cuts and Jobs Act, the performance-based compensation exception under Section 162(m) was repealed with respect to taxable years beginning after December 31, 2017, except that certain transition relief is provided for compensation paid pursuant to a written binding contract which was in effect on November 2, 2017 and which is not modified in any material respect on or after such date.

As a result, compensation paid to any of the Company's "covered employees" in excess of $1 million per taxable year generally will not be deductible unless it qualifies for the performance-based compensation exception under Section 162(m) pursuant to the transition relief provided by the Tax Cuts and Jobs Act. Because of certain ambiguities and uncertainties as to the application and interpretation of Section 162(m), no assurance can be given that any compensation paid by the Company will be eligible for such transition relief and qualify for the performance-based compensation exception under Section 162(m). Although the Compensation Committee will continue to monitor the applicability of Section 162(m) to the Company's ongoing compensation arrangements, the Compensation Committee also intends to continue to provide compensation for the Company's Named Executive Officers in a manner consistent with the best interests of the Company and its stockholders (which may include providing for compensation that is non-deductible due to the deduction limit under Section 162(m)).

In addition to considering the tax consequences, the Compensation Committee considers the accounting consequences of its decisions, including the impact of expenses being recognized in connection with equity-based awards, in determining the size and form of different equity-based awards.

Forward-Looking Statements

Except for the historical information contained herein, this Compensation Discussion and Analysis contains forward-looking statements, including, but not limited to, statements relating to the continued development of imetelstat by Geron; the therapeutic and commercial potential of imetelstat; potential regulatory approvals for imetelstat; our plans, considerations, expectations and determinations regarding future compensation decisions; and other statements that are not historical facts. These statements involve risks and uncertainties that can cause actual results to differ materially from those in such forward-looking statements. These risks and uncertainties, include, without limitation, risks and uncertainties related to: (i) whether the transition from Janssen to Geron proceeds expeditiously and without delay; (ii) whether the FDA or other regulatory authorities permit the ongoing or future clinical trials of imetelstat to proceed, including without limitation, the Phase 3 portion of IMerge; (iii) whether Geron is able to administer, operate and commence the Phase 3 portion of IMerge in a timely manner or at all; (iv) Geron's lack of experience in conducting large-scale, late-stage clinical trials, such as the Phase 3 portion of IMerge; (v) the significant additional research, non-clinical testing and clinical testing that will be required before Geron can file any application with the FDA or other regulatory authorities for regulatory approval of imetelstat and the substantial uncertainty as to whether imetelstat will ever be approved for commercial sale; and (vi) Geron's need for substantial additional capital, which may not be available to Geron. In addition, the actual executive compensation program that we adopt in the future may differ materially from the current executive compensation program summarized in this

Compensation Discussion and Analysis. Additional information on the above-stated risks and uncertainties and additional risks, uncertainties and factors that could cause actual results to differ materially from those in the forward-looking statements are contained in our periodic reports filed with the Securities and Exchange Commission under the heading "Risk Factors," including our Annual Report on Form 10-K for the year ended December 31, 2018. Undue reliance should not be placed on forward-looking statements, which speak only as of the date of this proxy statement and the facts and assumptions underlying the forward-looking statements may change. Except as required by law, we disclaim any obligation to update these forward-looking statements to reflect future information, events or circumstances.

COMPENSATION COMMITTEE REPORT

Our Compensation Committee has reviewed and discussed the Compensation Discussion and Analysis required by Item 402(b) of Regulation S-K and contained within this Proxy Statement with management and, based on such review and discussions, our Compensation Committee recommended to our Board that the Compensation Discussion and Analysis be included in this Proxy Statement and incorporated into our Annual Report on Form 10-K for the year ended December 31, 2018.

Submitted on March 27, 2019 by the members of the Compensation Committee of the Board of Directors:

Robert J. Spiegel, M.D., FACP	Compensation Committee Chair
Karin Eastham	Compensation Committee Member
V. Bryan Lawlis, Ph.D.	Compensation Committee Member

This Section is not "soliciting material," is not deemed "filed" with the SEC and is not to be incorporated by reference in any filing of the Company under the Securities Exchange Act of 1934, as amended, or the Securities Act of 1933, as amended, other than in Geron's Annual Report on Form 10-K where it shall be deemed to be furnished, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

EXECUTIVE COMPENSATION TABLES AND RELATED NARRATIVE DISCLOSURE

Summary Compensation Table

The following table includes information concerning compensation for the years ended December 31, 2018, 2017 and 2016 with respect to our Principal Executive Officer, Principal Financial Officer and our three other most highly compensated executive officers at December 31, 2018 (our "Named Executive Officers").

Name and Principal Position	Year	Salary ($)	Option Awards ($)[1]	Non-Equity Incentive Plan Compensation ($)[2]	All Other Compensation ($)[3]	Total ($)
John A. Scarlett, M.D.	2018	667,000	1,738,590	280,140	86,779	2,772,509
Chairman of the Board, President and	2017	644,000	1,625,925	386,400	62,985	2,719,310
Chief Executive Officer	2016	622,200	1,086,960	373,300	78,382	2,160,842
Olivia K. Bloom	2018	445,000	579,530	185,230	14,494	1,224,254
Executive Vice President, Finance,	2017	410,000	464,550	201,100	28,338	1,103,988
Chief Financial Officer and Treasurer	2016	387,200	380,436	179,500	28,546	975,682
Melissa A. Kelly Behrs	2018	400,000	496,740	169,200	41,081	1,107,021
Executive Vice President, Chief Business Officer	2017	386,500	464,550	189,600	37,892	1,078,542
	2016	373,400	380,436	173,100	40,981	967,917
Andrew J. Grethlein, Ph.D.	2018	430,000	496,740	181,890	41,605	1,150,235
Executive Vice President, Chief Operating Officer	2017	416,200	464,550	204,100	38,779	1,123,629
	2016	402,100	380,436	186,400	38,749	1,007,685
Stephen N. Rosenfield, J.D.	2018	356,000 [4]	496,740	148,185	13,937	1,014,862
Executive Vice President, Chief Legal Officer	2017	342,640 [4]	464,550	165,800	13,929	986,919
and Corporate Secretary	2016	331,000 [4]	380,436	153,400	13,897	878,733

(1) Amounts represent the aggregate grant date fair value of stock option awards granted during the applicable fiscal year as calculated in accordance with FASB ASC Topic 718. Refer to Note 7 of the financial statements in our Annual Report on Form 10-K for the year ended December 31, 2018 regarding assumptions underlying the valuation of stock option awards and the calculation method. The grant date fair value for the performance-based stock options of 1,500,000 shares for Dr. Scarlett and 750,000 shares each for Mses. Bloom and Behrs, Dr. Grethlein and Mr. Rosenfield, granted in November 2018 that vest upon the attainment of certain performance conditions, based upon the then-probable outcome of the performance conditions as computed in accordance with FASB ASC Topic 718, was zero for each award. Accordingly, for 2018, amounts shown under the "Option Awards" column do not include any value for these performance-based stock options. The grant date fair value of the 2018 performance-based stock options determined in accordance with FASB ASC Topic 718 based upon achieving the maximum level of performance under the respective performance conditions is $2,079,050 for Dr. Scarlett and $1,039,525 for each of Mses. Bloom and Behrs, Dr. Grethlein and Mr. Rosenfield. Refer to the tables under the sub-section entitled "Outstanding Equity Awards at Fiscal Year-End" for information as to each Named Executive Officers' vested and unvested stock option holdings, and under the sub-section entitled "Grants of Plan-Based Awards for 2018" for the number of stock options granted during 2018.

(2) Amounts disclosed under the "Non-Equity Incentive Plan Compensation" column represent the annual performance-based bonuses earned pursuant to our annual performance-based bonus plan. For further discussion, see the sub-section entitled "Compensation Discussion and Analysis – 2018 Annual Performance-Based Bonuses."

(3) Amounts shown include, as applicable: (i) reimbursements for housing and travel expenses; (ii) the portion of life and health insurance premiums paid by the Company; and (iii) the matching contribution made to the Geron 401(k) Plan on behalf of each Named Executive Officer. Amounts for the year ended December 31, 2018 were as follows:

Named Executive Officer	Housing and Travel Reimbursements ($)	Insurance Premiums ($)	401(k) Match ($)[a]	Total ($)
John A. Scarlett, M.D.	66,000	20,779	—	86,779
Olivia K. Bloom	—	2,244	12,250	14,494
Melissa A. Kelly Behrs	—	29,289	11,792	41,081
Andrew J. Grethlein, Ph.D.	—	29,355	12,250	41,605
Stephen N. Rosenfield, J.D.	—	1,687	12,250	13,937

(a) Under Geron's 401(k) Plan, all participating employees may contribute up to the annual Internal Revenue Service contribution limit. In November 2017, the Compensation Committee approved a matching contribution equal to 50% of each employee's annual contributions during 2018. The matching contribution was made in cash in January 2019.

(4) The actual base salary amounts reflect Mr. Rosenfield's employment at 80% full-time equivalent.

Grants of Plan-Based Awards for 2018

The following table sets forth information regarding grants of plan-based awards with respect to each of our Named Executive Officers for the fiscal year ended December 31, 2018:

			Estimated Future Payouts Under Non-Equity Incentive Plan Awards	Estimated Possible Payouts Under Equity Incentive Plan Awards	All Other Option Awards:		
Named Executive Officer	Approval Date	Grant Date	Target [1] ($)	Target (#)	Number of Securities Underlying Options [2] (#)	Exercise Price of Stock Options ($/Sh)	Grant Date Fair Value of Stock Option Awards [5] ($)
John A. Scarlett, M.D.	1/31/18	1/31/18	—	—	1,050,000	2.45	1,738,590
	11/7/18	11/7/18	—	500,000 [3]	—	1.72	—
	11/7/18	11/7/18	—	1,000,000 [4]	—	1.72	—
	—	—	400,200	—	—	—	—
Olivia K. Bloom	1/31/18	1/31/18	—	—	350,000	2.45	579,530
	11/7/18	11/7/18	—	250,000 [3]	—	1.72	—
	11/7/18	11/7/18	—	500,000 [4]	—	1.72	—
	—	—	200,250	—	—	—	—
Melissa A. Kelly Behrs	1/31/18	1/31/18	—	—	300,000	2.45	496,740
	11/7/18	11/7/18	—	250,000 [3]	—	1.72	—
	11/7/18	11/7/18	—	500,000 [4]	—	1.72	—
	—	—	180,000	—	—	—	—
Andrew J. Grethlein, Ph.D.	1/31/18	1/31/18	—	—	300,000	2.45	496,740
	11/7/18	11/7/18	—	250,000 [3]	—	1.72	—
	11/7/18	11/7/18	—	500,000 [4]	—	1.72	—
	—	—	193,500	—	—	—	—
Stephen N. Rosenfield, J.D.	1/31/18	1/31/18	—	—	300,000	2.45	496,740
	11/7/18	11/7/18	—	250,000 [3]	—	1.72	—
	11/7/18	11/7/18	—	500,000 [4]	—	1.72	—
	—	—	160,200	—	—	—	—

(1) This column sets forth the target amount of each Named Executive Officer's annual performance-based bonus for the fiscal year ended December 31, 2018 under our annual performance-based bonus plan. Accordingly, the amounts set forth in this column do not represent actual compensation earned by our Named Executive Officers for the fiscal year ended December 31, 2018. For the actual compensation paid to our Named Executive Officers for the fiscal year ended December 31, 2018, see the sub-section entitled "Summary Compensation Table." For further discussion, see the sub-section entitled "Compensation Discussion and Analysis – 2018 Annual Performance-Based Bonuses."

(2) Stock option vests in a series of 48 equal consecutive monthly installments commencing January 31, 2018, provided the executive officer continues to provide services to the Company.

(3) Stock option vests fully and becomes exercisable upon written certification by the Compensation Committee of the achievement of acceptance for review by the FDA of an NDA for the first imetelstat indication.

(4) Stock option vests fully and becomes exercisable upon written certification by the Compensation Committee of the achievement of regulatory approval by the FDA of an NDA for the first imetelstat indication.

(5) Amounts represent the grant date fair value of each stock option granted in 2018 calculated in accordance with FASB ASC Topic 718. Refer to Note 7 of the financial statements in our Annual Report on Form 10-K for the year ended December 31, 2018 regarding assumptions underlying the valuation of stock option awards and the calculation method. For additional detail on the grant date fair value of the performance-based stock options, see Summary Compensation Table – footnote (1) above.

Narrative Disclosure to Summary Compensation Table and Grants of Plan-Based Awards Table

Employment Agreements. Each of our Named Executive Officers has entered into a written employment agreement with Geron.

We entered into an employment agreement with Dr. Scarlett dated September 29, 2011, in connection with the commencement of his employment with us. Dr. Scarlett's employment agreement originally provided him with an annual base salary of $550,000, subject to increase, and an annual performance-based bonus targeted at 60% of his annual base salary. On February 11, 2014, we amended Dr. Scarlett's employment agreement to provide for an annual base salary of $586,500, subject to increase, and to include a "clawback provision," which clawback provision is described in more detail under the sub-section entitled "Compensation Discussion and Analysis – Compensation Recovery Provisions." On January 31, 2018, we further amended Dr. Scarlett's employment agreement to increase the reimbursement for housing expenses to not more than $4,000 per month. See the sub-section entitled "Compensation Discussion and Analysis – 2018 Perquisites" for more information on the reimbursement arrangements we provide to Dr. Scarlett for housing expenses and travel costs. On January 31, 2019, we amended and restated Dr. Scarlett's employment agreement to consolidate all of the previous amendments; to provide for an annual base salary of $690,000, subject to increase; and to clarify that in the event of a covered termination or change in control transaction, Dr. Scarlett will receive the greater of the severance benefits set forth in his employment agreement or the severance benefits provided for in the Company's Amended Severance Plan (without duplication). See the sub-section entitled "Amended Severance Plan" for further information.

We entered into an employment agreement with Ms. Bloom dated December 7, 2012, in connection with her appointment as our Senior Vice President, Finance, Chief Financial Officer and Treasurer, to provide an annual base salary of $330,000 and an annual performance-based bonus targeted at 40% of her annual base salary. On September 24, 2013, we amended Ms. Bloom's employment agreement to include a clawback provision. On February 11, 2014, in connection with her promotion to Executive Vice President, we amended Ms. Bloom's employment agreement to provide for an annual base salary of $365,000, subject to increase, and an annual performance-based bonus targeted at 45% of her annual base salary. On January 31, 2019, we amended and restated Ms. Bloom's employment agreement to consolidate all of the previous amendments; to provide for an annual base salary of $460,000, subject to increase; and to clarify that in the event of a covered termination or change in control transaction, Ms. Bloom will receive the greater of the severance benefits set forth

in her employment agreement or the severance benefits provided for in the Company's Amended Severance Plan (without duplication). See the sub-section entitled "Amended Severance Plan" for further information.

We entered into an employment agreement with Ms. Behrs effective January 31, 2013, in connection with her appointment as our Senior Vice President, Portfolio and Alliance Management, to provide an annual base salary of $341,550, subject to increase, and an annual performance-based bonus targeted at 40% of her annual base salary. On September 24, 2013, we amended Ms. Behrs' employment agreement to include a clawback provision. On February 11, 2014, in connection with her promotion to Executive Vice President, we amended Ms. Behrs' employment agreement to provide for an annual base salary of $352,000, subject to increase, and an annual performance-based bonus targeted at 45% of her annual base salary. On January 31, 2019, we amended and restated Ms. Behrs' employment agreement to consolidate all of the previous amendments; incorporate her new title of Chief Business Officer; to provide for an annual base salary of $425,000, subject to increase; and to clarify that in the event of a covered termination or change in control transaction, Ms. Behrs will receive the greater of the severance benefits set forth in her employment agreement or the severance benefits provided for in the Company's Amended Severance Plan (without duplication). See the sub-section entitled "Amended Severance Plan" for further information. In addition, we added a one-time relocation allowance of $10,000 to cover moving expenses for Ms. Behrs' relocation from California to New Jersey in connection with her transfer to the anticipated new Geron office in New Jersey. In addition, we are providing a monthly reimbursement of up to $3,000 per month for housing costs in New Jersey.

We entered into an employment agreement with Dr. Grethlein effective September 17, 2012, in connection with commencement of his employment with us, to provide an annual base salary of $355,000 and an annual performance-based bonus targeted at 45% of his annual base salary. On February 11, 2014, we amended Dr. Grethlein's employment agreement to provide for an annual base salary of $379,000, subject to increase, and to include a clawback provision. On January 31, 2019, we amended and restated Dr. Grethlein's employment agreement to consolidate all of the previous amendments; incorporate his new title of Chief Operating Officer; to provide for an annual base salary of $460,000, subject to increase; and to clarify that in the event of a covered termination or change in control transaction, Dr. Grethlein will receive the greater of the severance benefits set forth in his employment agreement or the severance benefits provided for in the Company's Amended Severance Plan (without duplication). See the sub-section entitled "Amended Severance Plan" for further information.

We entered into an employment agreement with Mr. Rosenfield effective February 16, 2012, in connection with commencement of his employment with us, to provide an annual base salary of $292,000, subject to increase and pro-rated to reflect Mr. Rosenfield's 80% of a full-time work schedule, and an annual performance-based bonus targeted at 45% of his annual base salary. On September 24, 2013, we amended Mr. Rosenfield's employment agreement to include a clawback provision. On January 31, 2019, we amended and restated Mr. Rosenfield's employment agreement to consolidate all of the previous amendments; incorporate his new title of Chief Legal Officer; to provide for an annual base salary of $368,000, subject to increase; and to clarify that in the event of a covered termination or change in control transaction, Mr. Rosenfield will receive the greater of the severance benefits set forth in his employment agreement or the severance benefits provided for in the Company's Amended Severance Plan (without duplication). See the sub-section entitled "Amended Severance Plan" for further information.

See also the sub-section entitled "Potential Payments Upon Termination or Change in Control" with respect to severance benefits payable under the employment agreements with our Named Executive Officers and under our Amended Severance Plan.

Annual Performance-Based Bonuses. We provide for annual bonuses to reward Named Executive Officers for performance in the prior fiscal year. For more information regarding our annual performance-based bonus plan, see the sub-section entitled "Compensation Discussion and Analysis – 2018 Annual Performance-Based Bonuses."

Equity Awards. Stock options awarded to our Named Executive Officers in January 2018 were granted under our 2011 Incentive Award Plan. Stock options awarded to our Named Executive Officers in November 2018 were granted under our 2018 Plan. Descriptions of the terms of the stock options granted to our Named

Executive Officers are included under the sub-section entitled "Compensation Discussion and Analysis – 2018 Equity Awards."

Our 2018 Plan was approved by our Board and our stockholders in 2018 and replaced our 2011 Incentive Award Plan. The 2018 Plan provides for the grant of stock options, restricted stock, restricted stock units, performance awards and other stock and cash awards. The exercise price of a stock option grant may not be less than 100% of the closing price of our Common Stock as reported by the Nasdaq Global Select Market on the date of grant. Stock option grants generally have a term of ten years, but may terminate sooner in connection with the holder's termination of service with us. Stock option grants vest based on conditions determined by the Compensation Committee or the Independent Board, which typically include continued service, but may also include performance goals and/or other conditions. The vesting of all equity awards granted under the 2018 Plan and 2011 Plan are subject to acceleration under certain termination or change in control circumstances as described under the sub-section entitled "Potential Payments Upon Termination or Change in Control."

Outstanding Equity Awards at Fiscal Year-End

The following table includes information with respect to all outstanding equity awards held by our Named Executive Officers as of December 31, 2018.

	Option Awards					
Named Executive Officer	**Grant Date**	**Number of Securities Underlying Unexercised Options Exercisable (#)**	**Number of Securities Underlying Unexercised Options Unexercisable (#)**	**Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)**	**Option Exercise Price ($/Sh)**	**Option Expiration Date**
John A. Scarlett, M.D.	9/29/11	1,000,000	—	—	2.16	9/29/21
	5/17/12	505,000	—	—	1.41	5/17/22
	2/13/13	1,340,000	—	—	1.50	2/13/23
	2/11/14	1,340,000	—	—	5.09	2/11/24
	3/13/15 (1)	562,500	37,500	—	4.34	3/13/25
	2/11/16 (1)	425,000	175,000	—	2.54	2/11/26
	2/9/17 (1)	481,250	568,750	—	2.15	2/9/27
	1/31/18 (1)	240,625	809,375	—	2.45	1/31/28
	11/7/18	—	—	500,000 (2)	1.72	11/6/28
	11/7/18	—	—	1,000,000 (3)	1.72	11/6/28
Olivia K. Bloom	5/29/09	20,000	—	—	6.52	5/29/19
	5/29/09	7,500	—	—	6.52	5/29/19
	5/29/09	20,000	—	—	6.52	5/29/19
	5/19/10	20,000	—	—	5.29	5/19/20
	5/20/11	50,000	—	—	4.65	5/20/21
	5/17/12	215,000	—	—	1.41	5/17/22
	2/12/13	400,000	—	—	1.51	2/12/23
	2/10/14	400,000	—	—	5.01	2/10/24
	3/13/15 (1)	196,875	13,125	—	4.34	3/13/25
	2/11/16 (1)	148,750	61,250	—	2.54	2/11/26
	2/9/17 (1)	137,500	162,500	—	2.15	2/9/27
	1/31/18 (1)	80,208	269,792	—	2.45	1/31/28
	11/7/18	—	—	250,000 (2)	1.72	11/6/28
	11/7/18	—	—	500,000 (3)	1.72	11/6/28

		Option Awards				
Named Executive Officer	Grant Date	Number of Securities Underlying Unexercised Options Exercisable (#)	Number of Securities Underlying Unexercised Options Unexercisable (#)	Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)	Option Exercise Price ($/Sh)	Option Expiration Date
Melissa A. Kelly Behrs	5/29/09	50,000	—	—	6.52	5/29/19
	5/29/09	20,000	—	—	6.52	5/29/19
	5/19/10	50,000	—	—	5.29	5/19/20
	5/19/10	10,000	—	—	5.29	5/19/20
	5/20/11	50,000	—	—	4.65	5/20/21
	5/17/12	300,000	—	—	1.41	5/17/22
	2/12/13	300,000	—	—	1.51	2/12/23
	2/10/14	400,000	—	—	5.01	2/10/24
	3/13/15 (1)	196,875	13,125	—	4.34	3/13/25
	2/11/16 (1)	148,750	61,250	—	2.54	2/11/26
	2/9/17 (1)	137,500	162,500	—	2.15	2/9/27
	1/31/18 (1)	68,750	231,250	—	2.45	1/31/28
	11/7/18	—	—	250,000 (2)	1.72	11/6/28
	11/7/18	—	—	500,000 (3)	1.72	11/6/28
Andrew J. Grethlein, Ph.D.	9/19/12	600,000	—	—	1.70	9/19/22
	2/12/13	300,000	—	—	1.51	2/12/23
	2/10/14	400,000	—	—	5.01	2/10/24
	3/13/15 (1)	196,875	13,125	—	4.34	3/13/25
	2/11/16 (1)	148,750	61,250	—	2.54	2/11/26
	2/9/17 (1)	137,500	162,500	—	2.15	2/9/27
	1/31/18 (1)	68,750	231,250	—	2.45	1/31/28
	11/7/18	—	—	250,000 (2)	1.72	11/6/28
	11/7/18	—	—	500,000 (3)	1.72	11/6/28
Stephen N. Rosenfield, J.D.	2/10/14	400,000	—	—	5.01	2/10/24
	3/13/15 (1)	196,875	13,125	—	4.34	3/13/25
	2/11/16 (1)	17,500	61,250	—	2.54	2/11/26
	2/9/17 (1)	25,000	162,500	—	2.15	2/9/27
	1/31/18 (1)	31,250	231,250	—	2.45	1/31/28
	11/7/18	—	—	250,000 (2)	1.72	11/6/28
	11/7/18	—	—	500,000 (3)	1.72	11/6/28

(1) Stock option vests in a series of 48 equal consecutive monthly installments commencing from the date of grant, provided the executive officer continues to provide services to the Company. In addition to the specific vesting schedule for each stock option, each unvested stock option is subject to potential future vesting acceleration as described under the sub-section entitled “Potential Payments Upon Termination or Change in Control” below.

(2) Stock option vests fully and becomes exercisable upon written certification by the Compensation Committee of the achievement of acceptance for review by the FDA of an NDA for the first imetelstat indication.

(3) Stock option vests fully and becomes exercisable upon written certification by the Compensation Committee of the achievement of regulatory approval by the FDA of an NDA for the first imetelstat indication.

Option Exercises and Stock Awards Vested in 2018

The following table provides information for stock options exercised, including the number of shares acquired upon exercise and the value realized, determined as described below, for the Named Executive Officers during the year ended December 31, 2018. No other stock award held by our Named Executive Officers vested during the year ended December 31, 2018.

	Option Awards	
Named Executive Officer	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise[1] ($)
John A. Scarlett, M.D.	—	—
Olivia K. Bloom	—	—
Melissa A. Kelly Behrs	—	—
Andrew J. Grethlein, Ph.D.	—	—
Stephen N. Rosenfield, J.D.	1,362,250	4,302,062

(1) The value realized on exercise is based on the difference between the closing price of our Common Stock on the date of exercise and the applicable exercise price of those options and does not represent actual amounts received by the Named Executive Officers as a result of the option exercises.

Pension Benefits

Other than with respect to tax-qualified defined contribution plans such as the 401(k) Plan, the Named Executive Officers do not participate in any plan that provides for retirement payments and benefits, or payments and benefits that will be provided primarily following retirement.

Non-Qualified Deferred Compensation

During the year ended December 31, 2018, the Named Executive Officers did not contribute to, or earn any amounts with respect to, any defined contribution or other plan sponsored by us that provides for the deferral of compensation on a basis that is not tax-qualified.

Additional Benefits

Our Named Executive Officers are eligible to participate in our benefit plans generally available to all employees, as described in the sub-section entitled "Compensation Discussion and Analysis – Broad-Based Benefits."

Pay Ratio Disclosure

Under SEC rules, we are required to calculate and disclose the annual total compensation of our median employee, as well as the ratio of the annual total compensation of our median employee as compared to the annual total compensation of our Chief Executive Officer (the "CEO Pay Ratio"). To identify our median employee, we used the following methodology:

- To determine our total population of employees, excluding our Chief Executive Officer, we included all 16 full-time employees and one part-time employee as of December 31, 2018.
- To identify our median employee from our total population of employees, we ranked each employee's fiscal 2018 base salary as of December 31, 2018 from lowest to highest, excluding the

Chief Executive Officer's fiscal 2018 base salary, and identified the median base salary from the list. We did not annualize the base salaries for part-time employees.

- We annualized the base salary for any employees who were employed by us for less than the entire 2018 fiscal year.

Once the median employee was identified, we calculated the annual total compensation of this employee for fiscal 2018 in a manner consistent with that used to calculate the annual total compensation for our Named Executive Officers in the Summary Compensation Table above.

For fiscal 2018, the annual total compensation (including base salary, grant date fair value of stock option awards granted during the year, and annual performance-based bonus) of the median employee of our total population of employees (other than our Chief Executive Officer) was $543,149 and the annual total compensation of our Chief Executive Officer, as reported in the Summary Compensation Table above, was $2,772,509. Based on this information, the ratio of the annual total compensation of our Chief Executive Officer to the median of the annual total compensation of all employees was 5.1 to 1.

The CEO Pay Ratio above represents our reasonable estimate calculated in a manner consistent with SEC rules and applicable guidance. SEC rules and guidance provide significant flexibility in how companies identify the median employee, and each company may use a different methodology and make different assumptions particular to that company. As a result, and as explained by the SEC when it adopted these rules, in considering the pay ratio disclosure, stockholders should keep in mind that the rule was not designed to facilitate comparisons of pay ratios among different companies, even companies within the same industry, but rather to allow stockholders to better understand and assess each particular company's compensation practices and pay ratio disclosures.

The Compensation Committee, the Independent Board and our management did not use the CEO Pay Ratio measure in making compensation decisions for our employees or Named Executive Officers in 2018.

Potential Payments Upon Termination or Change in Control

Employment Agreements

Our Named Executive Officers are entitled to certain severance benefits payable in connection with a Covered Termination (as defined below) under their employment agreements. Pursuant to these employment agreements, in the event of a Covered Termination and subject to a release of claims against Geron, each Named Executive Officer will be entitled to (i) a lump-sum severance payment equal to 12 months (24 months, with respect to Dr. Scarlett) of his or her base salary in effect as of such termination, (ii) a lump-sum payment equal to the pro-rated portion of any target annual performance-based bonus (except for Dr. Scarlett, who will receive a lump-sum equal to any annual bonus for any fiscal year that ends on or before the termination date that he would have received had he remained employed through the payment date), and (iii) continued COBRA coverage for a period of one year following a Covered Termination. In addition, the vested portion of any stock options, or other exercisable equity award in Geron, will remain exercisable until the earlier of the second anniversary of the date of termination and the original expiration date of such award.

For the purposes of our Named Executive Officers' employment agreements, the following definitions apply:

- "Covered Termination" generally means an Involuntary Termination Without Cause that occurs at any time, provided that such termination constitutes a "separation from service" within the meaning of Section 409A of the Code.
- "Involuntary Termination Without Cause" generally means an executive officer's dismissal or discharge other than: a) for Cause or b) following an involuntary or voluntary filing of bankruptcy, an assignment for the benefit of creditors, a liquidation of our assets in a formal proceeding or

otherwise or any other event of insolvency by Geron, in any case, without an offer of comparable employment by Geron or a successor, acquirer, or affiliate of Geron.

- "Cause" generally means the executive officer's:

  (i) willful act or omission constituting dishonesty, fraud or other malfeasance against the Company;

  (ii) conviction of a felony;

  (iii) debarment by the FDA from working in or providing services to any pharmaceutical or biotechnology company or other ineligibility under any law or regulation to perform the employee's duties to the Company; or

  (iv) breach of any material Company policies.

Amended Severance Plan

In September 2002, the Board approved a Severance Plan that originally became effective on January 21, 2003 and was subsequently amended and restated in May 2013 and in January 2019 (collectively referred to herein as the "Amended Severance Plan"). The Amended Severance Plan applies to all employees, including our Named Executive Officers, who are not subject to a performance improvement plan.

The Amended Severance Plan provides for cash severance benefits to be paid to employees, including our Named Executive Officers, under a "double trigger" situation, defined below as a Change in Control Triggering Event. Under this double trigger requirement, severance benefits are paid only upon the occurrence of a Change in Control and a termination of employment, with such termination being either by the Company or because the employee resigns due to a material change in their employment terms. The Board believes that a double trigger is considered industry standard and provides appropriate protection for our employees, including our Named Executive Officers, from post-Change in Control events that are not related to the employee's performance, encourages employees to stay throughout a transition period in the event of a Change in Control and does not provide for benefits for an employee who remains with the surviving company in a comparable position.

Under the Amended Severance Plan, the following definitions apply:

- "Change in Control Triggering Event" is defined as a termination without Cause in connection with a Change in Control (which has the same definition as under the 2018 Plan) or within 12 months following a Change in Control. Additionally, if an individual is terminated by the Company in connection with a Change in Control but immediately accepts employment with the Company's successor or acquirer, they will not be deemed to have had a Change in Control Triggering Event unless:

  (i) such individual is subsequently terminated without Cause by the successor or acquirer within the 12 months following the Change in Control;

  (ii) such individual resigns employment with the Company because in connection with a Change in Control he or she is offered terms of employment (new or continuing) by the Company or the Company's successor or acquirer within 30 days after the Change in Control that results in a material change in the terms of employment; or

  (iii) after accepting (or continuing) employment with the Company or the Company's successor or acquirer after a Change in Control, such individual resigns employment within 12 months following the Change in Control due to a material change in terms of employment as defined below.

- "Cause" generally means an employee's continued failure to satisfactorily perform duties, willful act or omission constituting dishonesty, fraud or other malfeasance against the Company, conviction of a felony, debarment by the FDA from working in or providing services to any

pharmaceutical or biotechnology company or other ineligibility under any law or regulation to perform the employee's duties to the Company, or breach of any material Company policies.

- "material change in terms of employment" shall occur if one of the following events occurs without the employee's consent:

  (i) base salary is materially reduced from that in effect immediately prior to the Change in Control;

  (ii) if as of the Change in Control they are employed at the director level or above, they are subject to a material reduction in their duties (including responsibilities and/or authority);

  (iii) their principal work location is to be moved to a location that is either more than 45 miles from their principal work location immediately prior to the Change in Control or more than 30 miles farther from their principal weekday residence than was their principal work location immediately prior to the Change in Control; or

  (iv) the Company or the Company's successor or acquirer materially breaches the terms of any employment or similar service agreement with the employee.

Additionally, in order for the resignation to be deemed due to a material change in terms of their employment, the employee must provide written notice to the Company's Chief Legal Officer within 30 days after the first occurrence of the event giving rise to a material change in their terms of employment setting forth the basis for their resignation, allow the Company at least 30 days from receipt of such written notice to cure such event, and if such event is not reasonably cured within such period, the employee's resignation from all positions they then hold with the Company is effective not later than 90 days after the expiration of the cure period.

Upon a Change in Control Triggering Event, each of our Named Executive Officers is entitled to: (i) a severance payment equal to 15 months (18 months, with respect to Dr. Scarlett) of his or her base salary then in effect as of such Change in Control Triggering Event; (ii) payment of his or her target annual bonus, at the target bonus percentage in effect immediately prior to his or her separation from service, prorated for the length of service provided in the termination year; and (iii) payment of COBRA premiums for up to 15 months (18 months, with respect to Dr. Scarlett). These benefits are consistent with severance plans offered at companies similar in size in our industry and competitive market environment. Payment of any severance benefits under the Amended Severance Plan is conditioned on the timely provision of an effective release of claims against Geron. If a Named Executive Officer is entitled to severance benefits upon a termination of employment under both the Amended Severance Plan and an employment agreement, the Named Executive Officer will receive the greater of such severance benefits (without duplication). The benefits provided under the Amended Severance Plan are not intended to be duplicative of those provided in any employment agreement.

Equity Plans

As set forth in each individual stock option under the 2018 Plan, in the event of a Change in Control of Geron (defined below), the vesting of each outstanding stock option held by all employees and non-employee directors will accelerate so that each stock option shall become fully exercisable for all of the outstanding shares subject to such stock option immediately prior to the consummation of such transaction and each other type of award shall be fully vested with all forfeiture restrictions on any or all of such awards to lapse. For purposes of the 2018 Plan, a "Change in Control" generally means and includes each of the following:

a) as a result of any merger or consolidation, the voting securities of Geron outstanding immediately prior thereto represent (either by remaining outstanding or by being converted into voting securities of the surviving or acquiring entity) less than 49% of the combined voting power of the voting securities of Geron or such surviving or acquiring entity outstanding immediately after such merger or consolidation; during any period of 24 consecutive calendar months, the individuals who at the beginning of such period constitute the board of directors, and any new directors whose election by such board of directors or nomination for election by stockholders was approved by a vote of at

least two-thirds of the members of such board of directors who were either directors on such board of directors at the beginning of the period or whose election or nomination for election as directors was previously so approved, for any reason cease to constitute at least a majority of the members thereof;

b) any individual, entity or group becomes the beneficial owner of more than 20% of the then outstanding shares of Geron Common Stock;

c) any sale of all or substantially all of the assets of Geron; or

d) the complete liquidation or dissolution of Geron.

In the event an employee or non-employee director experiences a termination of service as a result of the employee's or non-employee director's total and permanent disability (as defined in Section 22(e)(3) of the Code) or death, the 2018 Plan provides through each respective plan or the individual stock option agreement, that the portion of each outstanding stock option with time-based vesting held by such employee or non-employee director that would have vested during the 24 months after the date of such employee's termination of service (36 months for non-employee directors), will automatically vest. The stock options that were already vested upon the date of termination and those that automatically vested in connection with an employee's total and permanent disability or death will remain exercisable until the earlier of the second anniversary of the date of termination and the original expiration date of such stock option. For a non-employee director, the post-termination exercise period is the earlier of the third anniversary of the date of termination and the original expiration date of such stock option.

In the event an employee experiences a termination of service as a result of the employee's total and permanent disability (as defined in Section 22(e)(3) of the Code) or death, the individual stock option agreement for stock options with performance-based vesting permits the unvested portion of such stock option to continue to be eligible to vest and become exercisable upon the achievement of the performance goal set forth in the stock option grant notice to the extent such performance goal has not already been achieved as of the date of the employee's total and permanent disability or death, if and only if the performance goal occurs within the thirty-six (36) months following the date of the employee's total and permanent disability or death, however, not beyond the original term of the stock option.

Potential Payments Table

The table below summarizes potential maximum payments under the Amended Severance Plan, individual employment agreements or equity plans, as applicable, for our Named Executive Officers if a qualifying termination and/or change in control event had occurred on December 31, 2018, the last business day of our last completed fiscal year. As of December 31, 2018, all unvested stock options held by the Named Executive Officers were out-of-the-money, meaning that all of such unvested stock options had exercise prices that were higher than the closing price of our Common Stock on December 31, 2018 ($1.00 per share). As a result, the value of any stock option vesting acceleration benefits in connection with termination and/or change in control events, for purposes of the table below, is zero. This does not mean, however, that the Named Executive Officers will not receive any value as a result of stock option vesting acceleration benefits in connection with an actual termination and/or change in control event occurring in the future; the actual value that the Named Executive Officers would receive can be determined only at the time of such termination and/or change in control event.

Named Executive Officer	Qualifying Event	Severance	Continued Healthcare Benefits	Option Vesting	Total
John A. Scarlett, M.D.	Covered Termination – No Change in Control[1]	$1,734,200	$ 28,187	$ —	$1,762,387
	Termination Without Cause or for Good Reason – With Change in Control[2][3]	1,734,200	42,281	—	1,776,481
	Without Termination – With Change in Control[3]	—	—	—	—
	Death[4]	—	—	—	—
	Disability[5]	—	—	—	—
Olivia K. Bloom	Covered Termination – No Change in Control[1]	$ 645,250	$ 2,244	$ —	$ 647,494
	Termination Without Cause or for Good Reason – With Change in Control[2][3]	756,500	2,805	—	759,305
	Without Termination – With Change in Control[3]	—	—	—	—
	Death[4]	—	—	—	—
	Disability[5]	—	—	—	—
Melissa A. Kelly Behrs	Covered Termination – No Change in Control[1]	$ 580,000	$ 39,728	$ —	$ 619,728
	Termination Without Cause or for Good Reason – With Change in Control[2][3]	680,000	49,660	—	729,660
	Without Termination – With Change in Control[3]	—	—	—	—
	Death[4]	—	—	—	—
	Disability[5]	—	—	—	—
Andrew J. Grethlein, Ph.D.	Covered Termination – No Change in Control[1]	$ 623,500	$ 39,794	$ —	$ 663,294
	Termination Without Cause or for Good Reason – With Change in Control[2][3]	731,000	49,742	—	780,742
	Without Termination – With Change in Control[3]	—	—	—	—
	Death[4]	—	—	—	—
	Disability[5]	—	—	—	—
Stephen N. Rosenfield, J.D.	Covered Termination – No Change in Control[1]	$ 516,200	$ 1,687	$ —	$ 517,887
	Termination Without Cause or for Good Reason – With Change in Control[2][3]	605,200	2,108	—	607,308
	Without Termination – With Change in Control[3]	—	—	—	—
	Death[4]	—	—	—	—
	Disability[5]	—	—	—	—

(1) Amounts represent lump-sum severance payments (including the target annual performance-based bonus) and continued healthcare benefits that could be paid to a Named Executive Officer upon a Covered Termination as of December 31, 2018, not in connection with a Change in Control transaction. The amounts in this row do not include any value associated with the extension, if any, of the post-termination exercise period applicable to the Named Executive Officers' stock options.

(2) Amounts represent lump-sum severance payments (including the target annual performance-based bonus), continued healthcare benefits and the intrinsic value of acceleration of unvested stock options, based on a market value of $1.00 per share of Common Stock as of December 31, 2018, that could be paid to a Named Executive Officer under such Named Executive Officer's employment agreement and/or our Amended Severance Plan in the event of a Covered Termination or Change in Control Triggering Event on December 31, 2018, as applicable. Any payments made under a Named Executive Officer's employment agreement would not duplicate any payments due under the Amended Severance Plan. The amounts in this row do not include any value associated with the extension, if any, of the post-termination exercise period applicable to the Named Executive Officers' stock options.

(3) Amounts represent or include, as applicable, the intrinsic value of unvested stock options that would become fully vested and exercisable upon a Change in Control regardless of termination, based on a market value of $1.00 per share of Common Stock as of December 31, 2018. The amounts in this row do not include any value associated with the extension, if any, of the post-termination exercise period applicable to the Named Executive Officers' stock options.

(4) Amounts represent intrinsic value of unvested stock options that would become fully vested and exercisable upon a termination of service as a result of death, based on a market value of $1.00 per share of Common Stock as of December 31, 2018. The amounts in this row do not include any value associated

with the extension, if any, of the post-termination exercise period applicable to the Named Executive Officers' stock options.

(5) Amounts represent the intrinsic value of unvested stock options that would become fully vested and exercisable upon a termination of service as a result of total and permanent disability (as defined in Section 22(e)(3) of the Code), based on a market value of $1.00 per share of Common Stock as of December 31, 2018. The amounts in this row do not include any value associated with the extension, if any, of the post-termination exercise period applicable to the Named Executive Officers' stock options.

PROPOSAL 4

RATIFICATION OF SELECTION OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Audit Committee of the Board has selected Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2019, and has further directed that management submit the selection of the independent registered public accounting firm for ratification by our stockholders at the Annual Meeting. Ernst & Young LLP has served as our independent registered public accounting firm since 1992. Representatives of Ernst & Young LLP are expected to be present at the Annual Meeting, will have an opportunity to make a statement if they so desire, and will be available to respond to appropriate questions from stockholders.

We have been informed by Ernst & Young LLP that, to the best of their knowledge, neither the firm nor any of its members or their associates has any direct financial interest or material indirect financial interest in Geron or our affiliates.

Stockholder ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm is not required by our Bylaws or otherwise. However, the Board is submitting the selection of Ernst & Young LLP to our stockholders for ratification as a matter of good corporate practice. If our stockholders fail to ratify the selection, the Audit Committee and the Board will reconsider whether or not to retain that firm. Even if the selection is ratified, the Audit Committee and the Board in their discretion may direct the appointment of a different independent registered public accounting firm at any time during the year if they determine that such a change would be in the best interests of Geron and our stockholders.

Vote Required

Stockholder ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm requires the affirmative vote of the holders of a majority of the shares having voting power present in person or represented by proxy at the Annual Meeting. Abstentions will have the same effect as a vote against this proposal.

The Board of Directors Unanimously Recommends
That Stockholders Vote FOR Proposal 4

PRINCIPAL ACCOUNTANT FEES AND SERVICES

The Audit Committee maintains policies and procedures for the pre-approval of work performed by the independent registered public accounting firm. Under the Audit Committee's charter, all engagements of the independent registered public accounting firm must be approved in advance by the Audit Committee. Management recommendations will be considered in connection with such engagements, but management will have no authority to approve engagements. For each quarterly Audit Committee meeting, management prepares a schedule of all fees paid to Ernst & Young LLP during the previous quarter and estimated fees for projects contemplated in the following quarter. The Chairperson of the Audit Committee must be notified at any time the fees for a specific project exceed 20% of the approved budget for authorization to continue the project.

Audit Fees and All Other Fees

The Audit Committee approved 100% of all audit and other services provided by Ernst & Young LLP in 2018 and 2017. The total fees paid to Ernst & Young LLP for the last two fiscal years are as follows:

	Fiscal Year Ended December 31, 2018	Fiscal Year Ended December 31, 2017
Audit Fees[1]	$ 652,750	$ 490,000
Audit Related Fees[2]	28,000	—
Tax Fees	—	—
All Other Fees[3]	2,000	1,800
Total	$ 682,750	$ 491,800

(1) Audit Fees include the integrated audit of annual financial statements and internal control over financial reporting, reviews of quarterly financial statements included in Quarterly Reports on Forms 10-Q, consultations on matters addressed during the audit or quarterly reviews, and services provided in connection with SEC filings, including consents and comment and comfort letters.

(2) Audit Related Fees include accounting consultations, due diligence and audits in connection with a potential acquisition candidate.

(3) Amounts represent fees for access to Ernst & Young's technical research portal.

AUDIT COMMITTEE REPORT

The Audit Committee of Geron Corporation's Board of Directors is comprised of three independent directors as required by the listing standards of Nasdaq. The Audit Committee operates pursuant to a written charter that was last amended and restated by the Board in November 2017. A copy of the Audit Committee's amended and restated charter is available on our website at www.geron.com.

The members of the Audit Committee are Ms. Eastham (Chairperson), Dr. Lawlis and Mr. Bradbury. The Board has determined that all members of the Audit Committee are financially literate as required by Nasdaq. The Board has also determined that Ms. Eastham and Mr. Bradbury are audit committee financial experts as defined by Nasdaq. In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Audit Committee of the Company effective June 6, 2019, the date of the Annual Meeting.

The function of the Audit Committee is to assist the Board in fulfilling its oversight responsibilities regarding:

(i) the quality and integrity of our financial statements,

(ii) our compliance with legal and regulatory requirements,

(iii) the qualifications and independence of the independent registered public accounting firm serving as our auditors, and

(iv) the performance of the independent registered public accounting firm.

Management is responsible for Geron's internal controls and financial reporting. The independent registered public accounting firm is responsible for performing an independent audit of Geron's financial statements in accordance with generally accepted auditing standards and to issue a report thereon. The Audit Committee's responsibility is to monitor and oversee these processes.

In this context, the Audit Committee hereby reports as follows:

1) The Audit Committee has reviewed and discussed the audited financial statements of the Company as of and for the fiscal year ended December 31, 2018 with management and the independent registered public accounting firm serving as the Company's independent auditors.

2) The Audit Committee has discussed with the independent auditors the matters required to be discussed by Auditing Standard No. 1301 (Communication with Audit Committees) as adopted by the Public Company Accounting Oversight Board, other professional standards, membership provisions of the SEC Practice Session, and other SEC rules, as currently in effect.

3) The Audit Committee has received the written disclosures and the letter from the independent auditors required by applicable requirements of the Public Company Accounting Oversight Board regarding the independent auditor's communications with the Audit Committee concerning independence, and has discussed with the independent auditors the independent auditor's independence.

4) The Audit Committee has considered whether the independent auditor's provision of non-audit services to the Company is compatible with maintaining the independent auditor's independence.

Based on the reports and discussions described above, the Audit Committee recommended to the Board that the audited financial statements be included in Geron's Annual Report on Form 10-K for the year ended December 31, 2018, for filing with the SEC.

Submitted on February 27, 2019 by the members of the Audit Committee of Geron's Board of Directors.

Karin Eastham (Chairperson)
Daniel M. Bradbury
V. Bryan Lawlis, Ph.D.

This Section is not "soliciting material," is not deemed "filed" with the SEC and is not to be incorporated by reference in any filing of the Company under the Securities Exchange Act of 1934, as amended, or the Securities Act of 1933, as amended, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

EQUITY COMPENSATION PLAN INFORMATION

The following table summarizes information with respect to equity awards under Geron's equity compensation plans at December 31, 2018:

	Number of securities to be issued upon exercise of outstanding options, warrants and rights[1]	Weighted-average exercise price of outstanding options, warrants and rights	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))[1]
	(a)	(b)	(c)
Equity compensation plans approved by security holders	27,285,952 [2]	$ 2.72	8,841,307 [3]
Equity compensation plans not approved by security holders	—	—	4,000,000 [4]
Total	27,285,952	$ 2.72	12,841,307

(1) The table does not include information regarding Geron's 401(k) Plan. Under Geron's 401(k) Plan, all participating employees may contribute up to the annual Internal Revenue Service contribution limit. The Geron 401(k) Plan permits us to make matching contributions on behalf of plan participants, which matching contributions can be made in Common Stock that vests ratably over four years for each year of service completed by the employee, commencing from the date of hire, until it is fully vested when the employee has completed four years of service. As of December 31, 2018, there were approximately 544,377 shares of Common Stock held in this plan.

(2) Consists of 507,413 shares to be issued upon exercise of outstanding options under the 2002 Equity Incentive Plan, 20,237,039 shares to be issued upon exercise of outstanding options under the 2011 Plan, 5,896,000 shares to be issued upon exercise of outstanding options under the 2018 Plan and 645,500 shares to be issued upon exercise of outstanding options under the 2006 Directors' Option Plan.

(3) Consists of 876,908 shares of Common Stock available for issuance under the 2014 Employee Stock Purchase Plan, including an estimated 4,700 shares subject to purchase during the current offering period that commenced January 1, 2019 and ends on June 30, 2019, and 7,964,399 shares of Common Stock available for issuance under the 2018 Plan.

(4) Consists of 3,000,000 shares of Common Stock available for issuance under the 2018 Inducement Award Plan (the "2018 Inducement Plan") and 1,000,000 shares of Common stock issuable under the Directors Market Value Plan. The 2018 Inducement Plan provides for the grant of equity awards to individuals who were not previously Geron employees or directors, other than following a bona fide period of non-employment. All equity awards under the 2018 Inducement Plan are intended to meet the standards of Rule 5635(c)(4) of the Nasdaq Listing rules. The terms and conditions of the 2018 Inducement Plan and the equity awards to be granted thereunder are substantially similar to the 2018 Plan. Under the Directors Market Value Plan, to the extent permitted by the Director Compensation Policy, the cash compensation payable to a non-employee director who has properly elected to receive such cash compensation instead in the form of shares of Common Stock will be used to purchase shares of Common Stock from Geron under the Directors Market Value Plan on the date that such cash compensation is payable to the non-employee director under the Director Compensation Policy. On such date, we apply the amount of such cash compensation to the purchase of shares of Common Stock, subject to the limitations and other terms of the Directors Market Value Plan. The purchase price of each share of Common Stock acquired pursuant to the Directors Market Value Plan is equal to the "market value" on the purchase date (which generally means the consolidated closing bid price per share of Common Stock as reported by Nasdaq on the purchase date). A total of 1,000,000 shares of common stock has been reserved for the Directors Market Value Plan. The Directors Market Value Plan is intended to qualify for the limited exemption from stockholder approval pursuant to the Nasdaq Listing Rule 5635(c)(2), as a plan that merely provides

a convenient way to purchase shares from the Company at market value. As of December 31, 2018, no equity awards had been granted from the 2018 Inducement Plan and no shares had been issued from the Directors Market Value Plan. On January 29, 2019, the Compensation Committee approved an amendment to increase the reserve of shares of Common Stock under the 2018 Inducement Plan from 3,000,000 to 8,000,000 shares of Common Stock.

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The following table sets forth the amount and percentage of the outstanding shares of Common Stock, which, according to the information supplied to us, are beneficially owned by: (i) each person, or group of affiliated persons, who is known by us to be a beneficial owner of more than 5% of our outstanding Common Stock, (ii) each of our directors and nominees for director, (iii) each of our Named Executive Officers and (iv) all current directors and executive officers as a group. Unless otherwise indicated, the address for each of the stockholders in the table below is c/o Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025. Beneficial ownership is stated as of March 31, 2019.

	Beneficial Ownership[1]	
Beneficial Owner	Number of Shares	Percent of Total
Directors/Nominees and Named Executive Officers:		
Dawn C. Bir[2]	—	*
Daniel M. Bradbury[3]	530,063	*
Karin Eastham[4]	397,047	*
V. Bryan Lawlis, Ph.D.[5]	380,000	*
Susan M. Molineaux, Ph.D.[6]	452,980	*
Elizabeth G. O'Farrell[7]	—	*
Robert J. Spiegel, M.D., FACP[8]	281,848	*
Melissa A. Kelly Behrs[9]	1,907,989	1.0%
Olivia K. Bloom[10]	1,891,881	1.0%
Andrew J. Grethlein, Ph.D.[11]	1,976,642	1.1%
Stephen N. Rosenfield, J.D.[12]	810,749	*
John A. Scarlett, M.D.[13]	6,425,625	3.3%
All directors and executive officers as a group (12 persons)[14]	15,054,824	7.5%
5% Beneficial Holders:		
FMR LLC[15]	15,536,850	8.3%
245 Summer Street, Boston, MA 02210		
BlackRock, Inc.[16]	15,038,176	8.1%
55 East 52nd Street, New York, NY 10055		

* Represents beneficial ownership of less than 1% of Common Stock.

(1) Beneficial ownership is determined in accordance with the rules of the SEC. In computing the number of shares beneficially owned by a person and the percentage of ownership of that person, shares of Common Stock exercisable pursuant to the exercise of options held by that person that are currently exercisable or exercisable within 60 days of March 31, 2019 are deemed outstanding. Such shares, however, are not deemed outstanding for the purpose of computing the percentage ownership of each other person. Applicable percentages are based on 186,406,047 shares outstanding on March 31, 2019, adjusted as required by rules promulgated by the SEC. The persons named in this table, to the best of our knowledge, have sole voting and investment power with respect to all shares of Common Stock shown as beneficially owned by them, subject to community property laws where applicable and except as indicated in the other footnotes to this table.

(2) Ms. Bir was appointed to the Board in March 2019. In accordance with the Director Compensation Policy, Ms. Bir was granted a stock option to purchase 120,000 shares of Common Stock which vests

annually over three years upon each anniversary date of appointment to the Board. As a result, Ms. Bir did not have any shares issuable upon the exercise of outstanding options exercisable within 60 days of March 31, 2019.

(3) Consists of 142,776 shares held directly by Daniel M. Bradbury, 42,287 shares held by The Bradbury Family Trust and 345,000 shares issuable upon the exercise of outstanding options held by Mr. Bradbury exercisable within 60 days of March 31, 2019. In connection with his decision not to stand for re-election due to his new responsibilities as a chief executive officer for another public company, Mr. Bradbury will cease being a director and a member of the Audit Committee and the Nominating and Corporate Governance Committee of the Company effective June 6, 2019, the date of the Annual Meeting.

(4) Consists of 39,047 shares held directly by Karin Eastham and 358,000 shares issuable upon the exercise of outstanding options held by Ms. Eastham exercisable within 60 days of March 31, 2019.

(5) Consists of 380,000 shares issuable upon the exercise of outstanding options held by V. Bryan Lawlis exercisable within 60 days of March 31, 2019.

(6) Consists of 107,980 shares held by the Molineaux Family Trust and 345,000 shares issuable upon the exercise of outstanding options held by Dr. Molineaux exercisable within 60 days of March 31, 2019.

(7) Ms. O'Farrell was appointed to the Board in March 2019. In accordance with the Director Compensation Policy, Ms. O'Farrell was granted a stock option to purchase 120,000 shares of Common Stock which vests annually over three years upon each anniversary date of appointment to the Board. As a result, Ms. O'Farrell did not have any shares issuable upon the exercise of outstanding options exercisable within 60 days of March 31, 2019.

(8) Consists of 76,848 shares held directly by Robert J. Spiegel and 205,000 shares issuable upon exercise of outstanding options held by Dr. Spiegel exercisable within 60 days of March 31, 2019.

(9) Consists of 123,614 shares held directly by Melissa A. Kelly Behrs and 1,784,375 shares issuable upon exercise of outstanding options held by Ms. Behrs exercisable within 60 days of March 31, 2019.

(10) Consists of 115,839 shares held directly by Olivia K. Bloom and 1,776,042 shares issuable upon the exercise of outstanding options held by Ms. Bloom exercisable within 60 days of March 31, 2019.

(11) Consists of 2,267 shares held directly by Andrew J. Grethlein and 1,974,375 shares issuable upon the exercise of outstanding options held by Dr. Grethlein exercisable within 60 days of March 31, 2019.

(12) Consists of 17,624 shares held directly by Stephen N. Rosenfield and 793,125 shares issuable upon the exercise of outstanding options held by Mr. Rosenfield exercisable within 60 days of March 31, 2019.

(13) Consists of 125,000 shares held by the John A. Scarlett III 1999 Trust and 6,300,625 shares issuable upon exercise of outstanding options held by Dr. Scarlett exercisable within 60 days of March 31, 2019.

(14) Consists of shares beneficially owned by our current directors and executive officers as described in footnotes (2) through (13).

(15) The indicated ownership is based solely on a Schedule 13G/A filed with the SEC by FMR LLC ("FMR") on February 13, 2019, reporting beneficial ownership as of December 31, 2018. The Schedule 13G/A filed by the reporting person provides information only as of December 31, 2018, and, consequently, the beneficial ownership of the above-mentioned reporting person may have changed since December 31, 2018. FMR has sole voting power with respect to none of the shares and sole dispositive power with respect to all of the shares. FMR is the beneficial owner of 15,536,850 shares. Members of the Johnson family, including Abigail P. Johnson, are the predominant owners, directly or through trusts, of Series B voting common shares of FMR, representing 49% of the voting power of FMR. The Johnson family group and all other Series B shareholders have entered into a shareholders' voting agreement under which all Series B voting common shares will be voted in accordance with the majority vote of Series B voting common shares. Accordingly, through their ownership of voting common shares and the execution of the shareholders' voting agreement, members of the Johnson family may be deemed, under the Investment Company Act of 1940, to form a controlling group with respect to FMR. Neither FMR nor Abigail P. Johnson has the sole power to vote or direct the voting of the shares owned directly by the various

investment companies registered under the Investment Company Act ("Fidelity Funds") advised by Fidelity Management & Research Company, a wholly owned subsidiary of FMR, which power resides with the Fidelity Funds' Boards of Trustees. Fidelity Management & Research Company carries out the voting of the shares under written guidelines established by the Fidelity Funds' Boards of Trustees.

(16) The indicated ownership is based solely on a Schedule 13G/A filed with the SEC by BlackRock, Inc. ("BlackRock") on February 4, 2019, reporting beneficial ownership as of December 31, 2018. The Schedule 13G/A filed by the reporting person provides information only as of December 31, 2018, and, consequently, the beneficial ownership of the above-mentioned reporting person may have changed since December 31, 2018. BlackRock has sole voting power with respect to 14,709,843 shares and sole dispositive power with respect to all of the shares. BlackRock is the beneficial owner of 15,038,176 shares.

CERTAIN TRANSACTIONS

Certain Transactions With or Involving Related Persons

Since January 1, 2017, there has not been, nor is there currently proposed, any transaction or series of similar transactions to which the Company was or is to be a party in which the amount involved exceeds $120,000 and in which any current director, executive officer, holder of more than 5% of our Common Stock or any immediate family member of any of the foregoing persons had or will have a direct or indirect material interest other than with respect to compensation arrangements described under the sections entitled "Executive Compensation Tables and Related Narrative Disclosure" and "Compensation of Directors."

Policies and Procedures

Our Audit Committee is responsible for reviewing and approving all related party transactions, which would include a transaction, arrangement or relationship (or any series of similar transactions, arrangements or relationships) in which we and any "related person" are participants involving an amount that exceeds $120,000, not including transactions involving compensation for services provided to Geron as an employee, director, consultant or similar capacity by a related person. Related parties include any of our directors or executive officers, certain of our stockholders and their immediate family members. This obligation is set forth in writing in the Audit Committee charter. A copy of the Audit Committee charter is available on the Corporate Governance page under the Investor Relations section of our website at www.geron.com.

Where a transaction has been identified as a related-person transaction, management would present information regarding the proposed related-person transaction to the Audit Committee (or, where Audit Committee approval would be inappropriate, to another independent body of the Board) for consideration and approval or ratification. The presentation would include a description of, among other things, the material facts, the interests, direct and indirect, of the related persons, the benefits to Geron of the transaction and whether any alternative transactions were available. To identify related-person transactions in advance, the Audit Committee relies on information supplied by Geron's executive officers and directors. In considering related-person transactions, the Audit Committee takes into account the relevant available facts and circumstances including, but not limited to:

(i) the risks, costs and benefits to Geron;

(ii) the impact on a director's independence in the event the related person is a director, immediate family member of a director or an entity with which a director is affiliated;

(iii) the terms of the transaction;

(iv) the availability of other sources for comparable services or products; and

(v) the terms available to or from, as the case may be, unrelated third parties or to or from employees generally.

In the event a director has an interest in the proposed transaction, the director must recuse himself or herself from the deliberations and approval. In determining whether to approve, ratify or reject a related-person transaction, the Audit Committee considers, in light of known circumstances, whether the transaction is in, or is not inconsistent with, the best interests of Geron and our stockholders, as the Audit Committee determines in the good faith exercise of its discretion.

OTHER MATTERS

Section 16(a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Exchange Act requires our directors and executive officers, and persons who beneficially own more than 10% of a registered class of our equity securities (collectively, "Reporting Persons"), to file with the SEC initial reports of ownership and reports of changes in ownership of Geron Common Stock and other equity securities. Reporting Persons are required by SEC regulations to furnish us with copies of all Section 16(a) forms they file.

To our knowledge, based solely upon a review of the copies of such reports furnished to us and written representations from such directors, executive officers and stockholders that no other reports were required, we believe that during fiscal year ended December 31, 2018, all Reporting Persons complied with the applicable Section 16(a) reporting requirements.

Stockholder Nominations and Proposals for 2020 Annual Meeting

We expect to hold our 2020 Annual Meeting of Stockholders in May 2020. All proposals or director nominations by stockholders intended to be presented at the 2020 Annual Meeting of Stockholders must be directed to the attention of our Corporate Secretary, at the address set forth on the first page of this Proxy Statement.

To be considered for inclusion in next year's proxy materials, your proposal must be submitted in writing by December 28, 2019, to our Corporate Secretary at Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California, 94025, and must comply with all applicable requirements of Rule 14a-8 promulgated under the Exchange Act. However, if our 2020 Annual Meeting of Stockholders is not held between May 7, 2020 and July 6, 2020, then the deadline will be a reasonable time prior to the time we begin to print and send our proxy materials.

If you wish to bring a proposal before the stockholders or nominate a director at the 2020 Annual Meeting of Stockholders, but you are not requesting that your proposal or nomination be included in next year's proxy materials, you must notify our Corporate Secretary, in writing, not earlier than the close of business on February 6, 2020 and not later than the close of business on March 8, 2020. However, if the 2020 Annual Meeting of Stockholders is not held between May 7, 2020 and July 6, 2020, the notice must be delivered no later than the 90th day prior to the 2020 Annual Meeting of Stockholders or, if later, the 10th day following the day on which public disclosure of the date of the 2020 Annual Meeting of Stockholders is made. In addition, our Bylaws provide that the stockholder's notice must include certain information for the person making the proposal or the nomination for director, including:

- name and address;
- the class and number of shares of the Company, owned of record or beneficially owned;
- any derivative, swap or other transaction which gives economic risk similar to the ownership of shares of the Company;
- any proxy, agreement, arrangement, understanding or relationship that confers a right to vote any shares of the Company;

- any agreement, arrangement, understanding or relationship, engaged in to increase or decrease the level of risk related to, the voting power with respect to, and certain other arrangements or agreements with respect to, shares of the Company;
- any performance-related fees that the proposing/nominating person is entitled, based on any increase or decrease in the value of any shares of the Company; and
- any other information required by the SEC to be disclosed in a proxy statement or certain other filings. The stockholder's notice must also include information for each proposed director nominee, including:
  - the same information as for the nominating person set forth above;
  - all information required to be disclosed in a proxy statement in connection with election of directors; and
  - financial or other relationships between the nominating person and the nominee during the past three years.

Copies of our Bylaws may be obtained from our Corporate Secretary.

Director Nominees Recommended by Stockholders

The Nominating and Corporate Governance Committee, to date, has not adopted a formal policy with regard to the consideration of director candidates recommended by stockholders and will consider director candidates recommended by stockholders on a case-by-case basis, as appropriate. Stockholders who wish to recommend individuals for consideration by the Nominating and Corporate Governance Committee should send written notice to the Nominating and Corporate Governance Committee Chairman, Geron Corporation, 149 Commonwealth Drive, Suite 2070, Menlo Park, California 94025, within the time periods set forth above. Such notification should set forth all information relating to such nominee as is required to be disclosed in solicitations of proxies for elections of directors pursuant to Regulation 14A under the Exchange Act, including such person's written consent to being named in a proxy statement as a nominee and to serving as a director if elected, the name and address of such stockholder or beneficial owner on whose behalf the nomination is being made, the class and number of shares of the Company owned beneficially and of record by such stockholder or beneficial owner, and all information regarding the nominee that would be required to be included in the Company's proxy statement by the rules of the SEC, including the nominee's age, business experience for the past five years and any directorships held by the nominee during the past five years. The Nominating and Corporate Governance Committee does not intend to alter the procedure by which it evaluates candidates based on whether the candidate was recommended by a stockholder or not.

Director Qualifications

The Nominating and Corporate Governance Committee believes that nominees for election to the Board must possess certain minimum qualifications and attributes. The nominee:

- must meet the objective independence requirements set forth by the SEC and Nasdaq,
- must exhibit strong personal integrity, character and ethics, and a commitment to ethical business and accounting practices,
- must not be involved in on-going litigation with the Company or be employed by an entity which is engaged in such litigation, and
- must not be the subject of any on-going criminal investigations, including investigations for fraud or financial misconduct.

In addition, the Nominating and Corporate Governance Committee may consider the following criteria, among others:

(i) experience in corporate management, such as serving as an officer or former officer of a publicly held company, and a general understanding of marketing, finance and other elements relevant to the success of a publicly traded company in today's business environment;

(ii) experience in our industry and with relevant social policy concerns;

(iii) experience as a board member of other publicly held companies;

(iv) expertise in an area of our operations;

(v) practical and mature business judgment, including the ability to make independent analytical inquiries;

(vi) diversity of personal background, perspective, experience and other characteristics, such as gender, gender identity, ethnicity, sexual orientation and age; and

(vii) diversity of, business and professional background, perspective and experience relevant to the success of the Company.

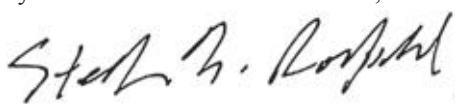
In general, the Nominating and Corporate Governance Committee aspires the Board to be comprised of individuals that represent a diversity of professional experiences and perspectives and who portray characteristics of diligence, commitment, mutual respect and professionalism with an emphasis on consensus building. The Board does not follow any ratio or formula to determine the appropriate mix. Rather, it uses its judgment to identify nominees whose backgrounds, attributes and experiences, taken as a whole, will contribute to the high standards of board service at Geron. As stated in our Nominating and Corporate Governance Committee Charter and our Corporate Governance Guidelines, as part of the director search process, the Nominating and Corporate Governance Committee endeavors to consider qualified candidates, including women and minorities, who meet the relevant business and search criteria. In furtherance of the foregoing, the Company has engaged a third-party search firm to furnish a list of qualified candidates who meet the above criteria, including women and minority candidates. In connection with its annual assessment of the performance of the Board, the Board committees and individual directors, the Nominating and Corporate Governance Committee evaluates board composition, including diversity of personal background and professional experience.

Directors are expected to rigorously prepare for, attend and participate in Board meetings and meetings of the committees of the Board on which they serve, to ask direct questions and require straight answers, and to spend the time needed and meet as frequently as necessary to properly discharge their responsibilities and duties as directors. Each Board member is expected to ensure that other existing and planned future commitments do not materially interfere with the member's service as an outstanding director.

General

Your proxy is solicited on behalf of our Board. Unless otherwise directed, proxies will be voted at the Annual Meeting (or an adjournment or postponement thereof), "FOR" all of the nominees listed in Proposal 1 and "FOR" Proposals 2, 3 and 4. If any matter other than those described in this Proxy Statement were to be properly submitted for a vote at the Annual Meeting, or with respect to any adjournment or postponement thereof, the proxy holders appointed by the Board will have the discretion to vote on those matters for you as they see fit.

By Order of the Board of Directors,



Stephen N. Rosenfield
Executive Vice President, Chief Legal Officer and Corporate Secretary

April 19, 2019

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APPENDIX 1

CERTIFICATE OF AMENDMENT
OF THE RESTATED CERTIFICATE OF INCORPORATION
OF GERON CORPORATION,
a Delaware corporation

The undersigned, Stephen Rosenfield, hereby certifies that:

FIRST. He is the duly elected and acting Executive Vice President, Chief Legal Officer and Corporate Secretary of Geron Corporation, a Delaware corporation (the "Corporation").

SECOND. The Corporation's Restated Certificate of Incorporation was filed with the Secretary of State of the State of Delaware (the "Secretary of State") on March 24, 1998; a Certificate of Designation was filed with the Secretary of State on March 27, 1998; a Certificate of Amendment of Restated Certificate of Incorporation was filed with the Secretary of State on December 14, 1999; a Certificate of Amendment of Restated Certificate of Incorporation was filed with the Secretary of State on June 28, 2000; a Certificate of Designation was filed with the Secretary of State on August 1, 2001; a Certificate of Designation was filed with the Secretary of State on August 1, 2001; a Certificate of Amendment of the Restated Certificate of Incorporation was filed with the Secretary of State on May 22, 2002; a Certificate of Amendment of the Restated Certificate of Incorporation was filed with the Secretary of State on May 25, 2006, and a Certificate of Amendment of the Restated Certificate of Incorporation was filed with the Secretary of State on May 17, 2012.

THIRD. The amendment of the Restated Certificate of Incorporation of the Corporation herein certified was duly adopted by this Corporation's Board of Directors and approved by the Corporation's stockholders in accordance with the applicable provisions of Section 242 of the General Corporation Law of the State of Delaware.

FOURTH. Article IV, Paragraph (A) of the Corporation's Restated Certificate of Incorporation is hereby amended to read in its entirety as follows:

> "(A) Class of Stock. The Corporation is authorized to issue two classes of stock to be designated, respectively, "Common Stock" and "Preferred Stock." The total number of shares which the Corporation is authorized to issue is Four Hundred Fifty-Three Million (453,000,000) shares. Four Hundred Fifty Million (450,000,000) shares shall be Common Stock, par value $0.001 per share, and Three Million (3,000,000) shares shall be Preferred Stock, par value $0.001 per share."

FIFTH. All other provisions of the Restated Certificate of Incorporation shall remain in full force and effect.

IN WITNESS WHEREOF, the undersigned has caused this Certificate of Amendment to be duly executed on behalf of the Corporation at Menlo Park, California this __ day of __ 2019.

GERON CORPORATION,
a Delaware corporation

By:

Stephen N. Rosenfield
Executive Vice President, Chief Legal Officer and Corporate Secretary

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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, 2018

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	**Name of each exchange on which registered**
Common Stock, $0.001 par value	**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 if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

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 $623,076,000 based upon the closing price of the registrant's common stock on June 29, 2018 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 1, 2019, there were 186,392,682 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE:

Document	**Form 10-K Parts**
Portions of the Registrant's definitive proxy statement for the 2019 annual meeting of stockholders to be filed pursuant to Regulation 14A within 120 days of the Registrant's fiscal year ended December 31, 2018	III

TABLE OF CONTENTS

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 our ability to timely transition the imetelstat program from Janssen Biotech, Inc., or Janssen, to us, 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, enforcement of our patent and proprietary rights, 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 commercialization of innovative therapeutics for hematologic myeloid malignancies. We have global rights to imetelstat, a first-in-class telomerase inhibitor, that was discovered and developed at Geron. We believe clinical data from two Phase 2 clinical trials of imetelstat (IMerge and IMbark, discussed below) conducted by Janssen Biotech, Inc., or Janssen, support further development of imetelstat in hematologic myeloid malignancies. We are working with Janssen to transition the imetelstat program to us. See further discussion below regarding our past and current relationship with Janssen.

We plan to open patient screening and enrollment by mid-year of 2019 in a Phase 3 clinical trial (Part 2 of IMerge) to evaluate imetelstat in transfusion dependent patients with Low or Intermediate-1 risk myelodysplastic syndromes, or MDS, who have relapsed after or are refractory to prior treatment with an erythropoiesis stimulating agent, or ESA, have not received prior treatment with either a hypomethylating agent or lenalidomide and do not have a deletion 5q chromosomal abnormality. This target population of lower risk MDS patients depend on serial red blood cell transfusions to manage symptoms of anemia and fatigue. However, dependency on transfusions is associated with poor survival, because of toxicity due to iron overload, as well as potential infections and allergic reactions. The ultimate goal for most trials of investigational agents in lower risk MDS is to enable patients to become transfusion independent for as long as possible. In December 2018, we reported results from the Phase 2 portion of IMerge in which 37% 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 high transfusion burdens, an indicator of a more difficult to treat population. Patients enrolled into 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, such as hypomethylating agents, or HMAs, which have a reported 8-week RBC-TI rate of 17%, or lenalidomide, which has a reported 8-week RBC-TI rate of 27%. In addition, among the patients in the Phase 2 portion of IMerge who achieved a durable response, as reflected by achieving a 24-week RBC-TI, all showed a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval. We believe these data suggest potential disease-modifying activity of imetelstat treatment.

Regarding our myelofibrosis, or MF, program, we reported data in December 2018 from the IMbark Phase 2 clinical trial, including the median overall survival of 29.9 months observed in the trial in comparison to the median overall survival of 14 – 16 months for patients previously treated with janus kinase, or JAK, inhibitors. We plan to discuss the IMbark data with experts in MF, as well as regulatory authorities, to consider how these results compare with other therapies currently available to MF patients, and to gain a better understanding of the potential significance of these results to patients and physicians. Because IMbark is the first clinical trial to apply rigorous, objective eligibility criteria to define patients considered relapsed or refractory to JAK inhibitors, we believe feedback from these discussions could provide important information on the feasibility, scope and design, including possible outcome measures, of any potential future clinical trials for imetelstat in Intermediate-2 or High-risk MF patients who have relapsed after or are refractory to prior treatment with a JAK inhibitor. We expect to outline our decision whether to continue late-stage development of imetelstat in MF by the end of the third quarter of 2019. This decision will be influenced by our assessment of what would be required to achieve clinical and regulatory success in MF, including the cost and duration of any potential clinical trials.

We had approximately $182.1 million in cash, cash equivalents, restricted cash and current and noncurrent marketable securities as of December 31, 2018, which is sufficient to commence the planned Phase 3 portion IMerge. If approved for marketing by regulatory authorities, we plan to commercialize imetelstat in the United States ourselves and seek potential commercialization partners for territories outside of the United States.

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 (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 nonclinical 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: 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 cells. 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. In vitro studies have suggested that tumor cells with short telomeres may be especially sensitive to the anti-proliferative effects of inhibiting telomerase. Our nonclinical data also suggest that inhibiting telomerase is particularly effective at limiting the proliferation of malignant progenitor cells, which have high levels of telomerase and are believed to be important drivers of tumor growth and progression.

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 M observed at 41 – 45 hours after a 7.5 mg/kg dose in patients. Imetelstat also has been shown in nonclinical studies to exhibit relatively preferential inhibition of the clonal proliferation of malignant progenitor cells compared to normal progenitors. 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.

Disease Characteristics of Hematologic Malignancies

Hematologic malignancies, or blood cancers, are classified according to the predominant location of the malignancy. A hematologic myeloid malignancy is a cancer that occurs in the precursor cells to red blood cells, platelets and white blood cells, such as granulocytes. Examples include acute myelogenous leukemia, chronic myelogenous leukemia, MDS and the myeloproliferative neoplasms, such as essential thrombocythemia, or ET, polycythemia vera and MF. These are different from lymphocytic malignancies which typically occur in the lymphoid lineage that includes white blood cells, such as 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 in the bone marrow that express higher telomerase activity and have shorter telomeres when compared to normal healthy cells.

Unmet Medical Need in Myelodysplastic Syndromes

MDS is a group of blood disorders in which the proliferation of malignant progenitor cell clones in the bone marrow results 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 acute myelogenous leukemia, or 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, or IPSS, 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 United States Food and Drug Administration, or 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 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 treatment 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 prolong survival in lower risk MDS, nor to delay disease progression.

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. The estimated prevalence of MF in the United States, or U.S., is approximately 13,000 patients, with an annual incidence of approximately 3,000 patients. 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, or DIPSS Plus, described in a 2011 *Journal of Clinical Oncology* article. There is currently only one targeted drug therapy, ruxolitinib, a JAK inhibitor, approved by the FDA and other regulatory authorities for treating these MF patients. Currently, no drug therapy is approved for those patients who fail or no longer respond to that treatment, and median survival for such MF patients is only approximately 14 – 16 months, representing a significant unmet medical need.

Developing Imetelstat to Treat Hematologic Myeloid Malignancies

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 may exhibit such 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.

IMerge (Phase 2/3 Trial) in Lower Risk MDS

Trial Design

IMerge is a two-part clinical trial evaluating imetelstat in transfusion dependent patients with Low or Intermediate-1 risk, also referred to as lower risk, MDS, who have relapsed after or are refractory to prior treatment with an ESA. Part 1 of IMerge was designed as a Phase 2, open-label, single-arm trial to assess the efficacy and safety of imetelstat administered as an intravenous infusion at a starting dose of 7.5 mg/kg every four weeks in approximately 30 patients, and originally was conducted by Janssen as part of a Collaboration and License Agreement, or the Collaboration Agreement. See further discussion below regarding our past and current relationship with Janssen. The first patient was dosed in January 2016. To be eligible for the Phase 2 portion of

IMerge, patients were 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 before entry into the trial.

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.

32 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 were presented at the European Hematology Association, or EHA, Annual Congress, in June 2018. These data 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%). The safety profile in the Phase 2 portion of IMerge was consistent with prior clinical trials of imetelstat in hematologic malignancies, and no new safety signals were identified. The most frequently reported adverse events were cytopenias, which were predictable, manageable and reversible, in most cases, including Grade 3 and 4, or severe, neutropenia and thrombocytopenia. In addition, reported adverse events did not differ significantly between the overall trial population and the 13-patient initial cohort.

Based on the preliminary data from the initial cohort of 13 patients, Janssen expanded new patient enrollment in the Phase 2 portion of IMerge and enrolled 25 additional patients, or an expansion cohort, who are non-del(5q) and naïve to HMA and lenalidomide treatment, to increase the clinical experience and confirm the benefit-risk profile of imetelstat in this target patient population. In November 2017, the first patient was dosed in the expanded Phase 2 portion of IMerge and enrollment was completed in February 2018.

Detailed results for the target patient population (n=38) from the combined initial cohort of 13 patients and expansion cohort of 25 patients were recently presented at the 60th American Society of Hematology, or ASH, Annual Meeting and Exposition in December 2018. A summary of the results is below.

ASH Presentation Highlights

In the ASH presentation, results were reported using a clinical cut-off date of October 26, 2018. For the initial 13-patient cohort, the median follow-up was 29.1 months and for the 25-patient expansion cohort, the median follow-up was 8.7 months. The median number of treatment cycles was 8.0 (range: 1 – 34) and the mean dose intensity was 6.9 mg/kg/cycle. The baseline characteristics of the aggregate 38 patients in the combined cohorts highlight the high transfusion burden of these patients, indicating the significant disease burden of this patient population.

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 (range) RBC transfusion burden, units/8 weeks	8 (4–14)
WHO 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 EPO > 500 mU/mL, n (%)	12[a] (32%)

[a] Of the 37 patients with sEPO (serum erythropoietin) levels reported.

The 8-week RBC-TI rate for the 38 patients in the combined cohorts was 37% and 26% of patients achieved a durable response with 24-week RBC-TI. In addition, among the patients achieving durable transfusion independence, all showed a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval. We believe these data suggest potential disease-modifying activity of imetelstat treatment. In addition, similar 8-week RBC-TI rates were observed between ringed sideroblast positive (37%) patients and other patients (36%), and between those patients with baseline erythropoietin levels >500 mU/mL (33%) and ≤500 mU/mL (40%), indicating the broad clinical activity of imetelstat in the Phase 2 portion of this trial. These and other efficacy data are also summarized in the table below:

Key Efficacy Outcomes	**n=38**
Rate of 8-week RBC-TI, n (%)	14 (37%)
Rate of 24-week RBC-TI, n (%)	10 (26%)
Median time to onset of RBC-TI (range), weeks	8.1 (0.1-33.1)
Median duration of RBC-TI (range), weeks	Not Evaluable (17.0-NE)
Rate of transfusion reduction (hematologic improvement-erythroid, or HI-E), n (%)	27 (71%)
Mean relative reduction of RBC transfusion burden from baseline, %	-68%
CR+ marrow CR + PR (per International Working Group, or IWG), n (%)	8 (21%)

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. Nineteen patients (50%) had dose reductions and 26 patients (68%) had cycle delays. Reversible Grade 3 liver function test, or LFT, elevations were observed in three patients (8%) and an independent Hepatic Review Committee deemed the observed LFT elevations were not imetelstat-related hepatic toxicities.

Most Common Treatment-Emergent Adverse Events (TEAE)	**Patients ≥ 1 TEAE**	
	Grade 1-2	**Grade ≥ 3**
Neutropenia	1	21
Thrombocytopenia	2	23
Anemia	2	7
Leukopenia	0	7
Aspartate Aminotransferase, or AST, increased	3	3
Alanine Aminotransferase, or ALT, increased	5	2
Headache	5	1
Bronchitis	4	2
Nasopharyngitis	6	0
Diarrhea	6	0
Peripheral edema	6	0
Back pain	4	2

The majority of Grade ≥3 neutropenia and thrombocytopenia were reversible within four weeks as shown in the table below:

Occurrence and Reversibility of Cytopenias	**All events n=38**	**Recovered in < 4wks of patients with an event**
Neutrophils, n (%)		
Grade 3	10 (26%)	8 (80%)
Grade 4	12 (32%)	12 (100%)
Platelets, n (%)		
Grade 3	14 (37%)	13 (93%)
Grade 4	10 (26%)	9 (90%)

Current Status of the Phase 2 Portion of IMerge

The Phase 2 portion of IMerge has been officially closed to new patient enrollment and patients remaining in the treatment phase are eligible to continue to receive imetelstat treatment, per investigator discretion. Data collection and patient follow-up continue in accordance with the trial protocol and is being conducted by Janssen during the program transition period. In connection with the transition of the imetelstat program, we expect sponsorship for IMerge to be transferred from Janssen to us by the end of the second quarter of 2019. Once the IND transfer has been completed, we will assume responsibility for treating and following patients in accordance with the Phase 2 trial protocol.

We expect more mature data from the patients continuing in the treatment phase of the Phase 2 portion of IMerge to be available in 2019 and anticipate submitting such data for presentation at a future medical conference in 2019.

Plan for IMerge Phase 3 Clinical Trial to Begin by Mid-Year 2019

Based on the results of the Phase 2 portion of IMerge, we intend to continue the development of imetelstat in lower risk MDS. Importantly, the 37% 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 HMAs, with a reported 8-week RBC-TI rate of 17% or lenalidomide, with a reported 8-week RBC-TI rate of 27%. Also, the IMerge results were observed in patients with high transfusion burdens, an indicator of a more difficult to treat population and among the patients who achieved durable transfusion independence in the Phase 2 portion of IMerge, all showed a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval. We believe these data suggest potential disease-modifying activity of imetelstat treatment.

We expect patient screening and enrollment of Part 2, or the Phase 3 portion, of IMerge, to begin by mid-year of 2019, after sponsorship of the ongoing imetelstat clinical trials has been transferred from Janssen to us. The Phase 3 portion of IMerge is a double-blind, randomized, placebo-controlled trial in approximately 170 patients, which will evaluate imetelstat in transfusion dependent patients with Low or Intermediate-1 risk MDS, who have relapsed after or are refractory to prior treatment with an ESA, have not received prior treatment with either an HMA or lenalidomide and do not have a deletion 5q chromosomal abnormality. We expect the trial to be conducted at multiple medical centers globally, including North America, Europe and Asia. Trial design information for the Phase 3 portion of IMerge, including patient eligibility criteria and locations of clinical sites, will be posted on clinicaltrials.gov.

IMbark (Phase 2 Trial) in Relapsed/Refractory MF

Trial Design

IMbark was designed as a Phase 2 clinical trial to evaluate two starting dose levels of imetelstat (either 4.7 mg/kg or 9.4 mg/kg administered by intravenous infusion every three weeks) in approximately 200 patients with Intermediate-2 or High-risk MF who have relapsed after or are refractory to prior treatment with a JAK inhibitor. We believe IMbark is the first clinical trial to rigorously define this specific patient population, as currently there is no established clinical definition for relapsed after or refractory to prior treatment with a JAK inhibitor. Patients eligible for the trial were required to have active symptoms of MF, together with worsening of splenomegaly-related abdominal pain at any time after the start of JAK inhibitor therapy, and either: no reduction in spleen volume or size after 12 weeks of JAK inhibitor therapy, or worsening splenomegaly after the start of JAK inhibitor therapy, as documented by an increase in spleen volume from its lowest point, or nadir, by 25% when measured by imaging, or an increase in spleen size when assessed by palpation. IMbark was originally conducted by Janssen as part of the Collaboration Agreement.

The co-primary efficacy endpoints for the trial are spleen response rate, defined as the proportion of patients who achieve a ≥35% reduction in spleen volume assessed by imaging, and symptom response rate, defined as the proportion of patients who achieve a ≥50% reduction in Total Symptom Score, or TSS, at 24 weeks. Key secondary endpoints are safety and overall survival. Other secondary efficacy endpoints include the number of patients achieving complete remission, or CR, or partial remission, or PR, clinical improvement, or CI, and anemia, spleen and symptom responses. Exploratory endpoints include cytogenetic and molecular responses, as well as leukemia-free survival.

The first patient in IMbark was dosed in September 2015 and the last patient was enrolled in October 2016. Janssen initiated a protocol-specified primary analysis of IMbark in the second quarter of 2018. The IMbark protocol-specified primary analysis, which included an assessment of overall survival, or OS, coincided with the protocol-specified final analysis for the trial, due to an overlap in the dates triggering each analysis, which resulted in a joint primary/final analysis, which we refer to herein as the primary analysis. The results of this primary analysis and updated data on overall survival were presented at the ASH Annual Meeting and Exposition in December 2018. A summary of the results is below.

ASH Presentation Highlights

As reported in the ASH presentation, a total of 107 patients were enrolled in IMbark (48 in the 4.7 mg/kg dosing arm and 59 in the 9.4 mg/kg dosing arm). At the time of the April 26, 2018 clinical cut-off for the primary analysis, patients in IMbark had been followed for a median of 22.6 months (range: 0.2 – 27.4), including median treatment duration of 26.9 weeks (range: 0.2 – 118.1). Seven patients remained on active treatment and 50 patients were being followed for survival. The baseline characteristics of the patients enrolled in IMbark, as presented at ASH and highlighted below, indicate the advanced nature of the disease in, and the potential difficulty to treat, this patient population:

Patient Baseline Characteristic Highlights	**4.7 mg/kg (n = 48)**	**9.4 mg/kg (n = 59)**	**Total (n = 107)**
Median age (range), years	68.5 (44 – 84)	67 (31 – 86)	68.0 (31 – 86)
Myelofibrosis subtype, n (%)			
Primary	27 (56%)	36 (61%)	63 (59%)
Post-Essential Thrombocythemia, or ET	9 (19%)	10 (17%)	19 (18%)
Post-Polycythemia Vera, or PV	12 (25%)	13 (22%)	25 (23%)
DIPSS risk status, n (%)			
Intermediate-1 risk	1[a] (2%)	0 (0%)	1 (1%)
Intermediate-2 risk	28 (58%)	34 (58%)	62 (58%)
High-Risk	19 (40%)	25 (42%)	44 (41%)
Spleen volume (MRI) – Median, IRC (range), cm^3	3353 (726 – 7243)	2998 (890 – 7607)	3167 (726 – 7607)
Platelet count – Median (range), $x10^9/L$	153 (74 – 1097)	146 (65 – 798)	147 (65 – 1097)
Time since initial diagnosis – Median (range), months	49 (2 – 227)	43 (7 – 201)	44 (2 – 227)
Duration of prior JAKi Tx – Median (range), months	22 (3 – 90)	25 (1 – 73)	23 (1 – 90)
Triple negative [b], n (%)	10 (21%)	16 (28%)	26 (25%)
High molecular risk [c], n (%)	36 (75%)	35 (61%)	71 (68%)

[a] Indicated in electronic case report form comments, but does not appear in statistical output. This is a protocol deviation.

[b] Absence of JAK2 V617F, CALR or MPL mutations. Indicator of a poor prognosis.

[c] One or more mutations in ASXL1, EZH2, SRSF2, IDH1, or IDH2. An indicator of progressive disease in the patient.

Six patients (10%) in the 9.4 mg/kg dosing arm and no patients in the 4.7 mg/kg dosing arm had a spleen response per imaging. The spleen volume response rate observed, including in the 9.4 mg/kg dosing arm, was less than that reported in clinical trials with JAK inhibitors in front-line MF patients. Nineteen patients (32%) in the 9.4 mg/kg dosing arm and three patients (6%) in the 4.7 mg/kg dosing arm had a symptom response.

For the assessment of OS, the clinical cut-off date for the ASH presentation was October 22, 2018. The median follow-up was 27.4 months (range: 0.2 – 33.0). The median OS in the 9.4 mg/kg dosing arm was 29.9 months. These and other efficacy data are also summarized in the table below:

	Dosing Arm	
n (%)	**4.7 mg/kg**	**9.4 mg/kg**
Number of enrolled patients	48	59
Spleen response rate	0 (0%)	6 (10%)
Symptom response rate	3 (6%)	19 (32%)
Complete remission rate	0 (0%)	0 (0%)
Partial remission rate	0 (0%)	1 (2%)
Median overall survival	19.9 mos	29.9 mos

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.

n (%)	4.7 mg/kg (n = 48)		9.4 mg/kg (n = 59)	
	All Grades	Grade ≥ 3	All Grades	Grade ≥ 3
Hematologic (≥ 10% in either arm)				
Thrombocytopenia	11 (23%)	11 (23%)	29 (49%)	24 (41%)
Anemia	15 (31%)	15 (31%)	26 (44%)	23 (39%)
Neutropenia	5 (10%)	5 (10%)	21 (36%)	19 (32%)
Leukopenia	3 (6%)	3 (6%)	8 (14%)	8 (14%)
Non-hematologic (≥ 20% in either arm)				
Nausea	15 (31%)	1 (2%)	20 (34%)	2 (3%)
Vomiting	10 (21%)	1 (2%)	8 (14%)	1 (2%)
Diarrhea	18 (38%)	2 (4%)	18 (31%)	0 (0%)
Fatigue	10 (21%)	3 (6%)	16 (27%)	4 (7%)
Cough	11 (23%)	0 (0%)	9 (15%)	0 (0%)
Dyspnea	9 (19%)	6 (13%)	14 (24%)	3 (5%)
Abdominal pain	10 (21%)	2 (4%)	14 (24%)	3 (5%)
Asthenia	9 (19%)	3 (6%)	14 (24%)	6 (10%)
Pyrexia	8 (17%)	1 (2%)	13 (22%)	3 (5%)
Edema peripheral	13 (27%)	0 (0%)	11 (19%)	0 (0%)

Most cytopenias resolved within four weeks. Grade 3/4 LFT elevations were observed in seven patients on study. An independent Hepatic Review Committee deemed that the observed LFT elevations were not imetelstat-related hepatic toxicities.

Current Status of IMbark

The trial has been officially closed to new patient enrollment since March 2018 and has entered an extension phase to enable patients remaining in the treatment phase to continue to receive imetelstat treatment, per investigator discretion. During the extension phase, which is being conducted by Janssen during the program transition period, standard data collection will primarily consist of safety information.

In connection with the transition of the imetelstat program, we expect sponsorship for IMbark to be transferred from Janssen to us by the end of the second quarter of 2019. Once the IND transfer has been completed, we will be responsible for following patients in accordance with the extension phase protocol.

For MF, we plan to discuss the results of the IMbark primary analysis, including the assessment of OS, with experts in MF, as well as regulatory authorities, to consider how these results compare with other therapies currently available to MF patients, and to gain a better understanding of the potential significance of these results to patients and physicians. We believe feedback from these discussions will provide important information on the feasibility, scope and design, including possible outcome measures, of any potential future clinical trials for imetelstat in Intermediate-2 or High-risk MF patients who have relapsed after or are refractory to prior treatment with a JAK inhibitor. We expect to outline our decision whether to continue late-stage development of imetelstat in MF by the end of the third quarter of 2019. This decision will be influenced by our assessment of what would be required to achieve clinical and regulatory success in MF, including the cost and duration of any potential clinical trials.

Transition from Janssen

In December 2014, we entered into the Collaboration Agreement with Janssen, pursuant to which Janssen conducted IMbark and IMerge. Janssen terminated the Collaboration Agreement effective September 28, 2018, and upon the effective date of termination, we regained the global rights to the imetelstat program. Under the terms of the Collaboration Agreement, Janssen is required to provide operational support for the imetelstat program during transition of the program to us. Each company is responsible for its own costs incurred related to transition activities, unless otherwise specified in the Collaboration Agreement. We expect the transition process to be completed by September 2019 to enable the orderly transfer of all ongoing clinical, regulatory, medical affairs and non-clinical activities to us, including transfer of the sponsorship of ongoing imetelstat clinical trials from Janssen to us. In addition, following the effective date of termination of the Collaboration Agreement, we expect Janssen to supply imetelstat to us for up to 24 months during a transition period for clinical manufacturing and such supply will be charged to us at Janssen's cost plus a premium. See "Licensing—Former Collaboration and License Agreement with Janssen" below, for more information about the Collaboration Agreement.

We have engaged Parexel International (IRL) Limited, or Parexel, a global contract research organization, or CRO, to support imetelstat clinical development activities. In addition to recently hiring a head of Pharmacovigilance and Drug Safety and a Chief Medical Officer in January of 2019, we are actively recruiting senior personnel to staff our internal drug development group, as well as contract with subject matter experts in clinical science, biostatistics, clinical operations, pharmacovigilance, quality, manufacturing and regulatory affairs.

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" under Item 1A, "Risk Factors".

The development of biotechnology products, including imetelstat, typically includes the early development of a technology, 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 biotechnology products are often protected by several families of patent filings that are filed at different times during product development 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 in the United States, Europe and other countries related to imetelstat. 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.

Product Candidate	U.S. Patent Status / Expiration Date	Europe Patent Status / Expiration Date	Japan Patent Status / Expiration Date
Imetelstat (composition of matter)	Issued / 2025	Issued / 2024	Issued / 2024

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 all of the worldwide rights to imetelstat. 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 bear all of the costs for maintaining, prosecuting and litigating all imetelstat intellectual property that we own.

Telomerase

Our U.S. patent rights relating to telomerase that cover technologies, such as variants of the protein component of human telomerase, or hTERT, are co-owned with and in-licensed exclusively from the University of Colorado. We expect the last of these U.S. patent rights to expire in 2019. A U.S. patent for identifying inhibitors of telomerase activity is in-licensed from the University of Texas Southwestern Medical Center and the University of California and will expire in 2019. The expiration of these patents is not expected to have any impact on our intellectual property rights related to imetelstat, or our continued planned development of imetelstat. See Item 1A, “Risk Factors” for additional information regarding our patent rights relating to telomerase.

Licensing

Former Collaboration and License Agreement with Janssen

On November 13, 2014, we entered into the Collaboration Agreement, pursuant to which we granted to 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. The Collaboration Agreement became effective on December 15, 2014, and we received $35 million from Janssen as an upfront payment.

We regained the global rights to imetelstat upon Janssen’s termination of the Collaboration Agreement effective September 28, 2018. As a result of the termination of the Collaboration Agreement, we will not receive any further milestone payments or royalties from Janssen for the development or commercialization of imetelstat, including any clinical development or sales milestones, and Janssen has no further 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.

Under the termination provisions of the Collaboration Agreement, Janssen is required to provide certain operational support for the imetelstat program during transition of the program to us. The transition process is expected to occur through September 2019 to enable the orderly transfer of all ongoing clinical, regulatory, medical affairs and non-clinical activities to us, including the transfer of the sponsorship of ongoing imetelstat clinical trials from Janssen to us. Each company is responsible for costs incurred related to transition activities unless otherwise specified in the Collaboration Agreement. Under the Collaboration Agreement, Janssen is required, among other things, to:

- assign all regulatory files and regulatory clearances specific to imetelstat to us, including sponsorship of the ongoing clinical trials, IMbark and the Phase 2 portion of IMerge;
- transfer all safety data to us;
- facilitate negotiations between us and any subcontractors of Janssen performing development or manufacturing activities related to imetelstat;

- transfer any remaining inventory of imetelstat to us at Janssen's cost plus a premium, and use commercially reasonable efforts to facilitate an orderly and prompt transition of manufacturing activities to us; and
- supply imetelstat drug product to us at Janssen's cost plus a premium for up to 24 months following the termination of the Collaboration Agreement, while we seek to re-establish our own supply chain for clinical manufacturing of imetelstat.

Until the sponsorship responsibilities for imetelstat transfers from Janssen to us, including the U.S. Investigational New Drug, or IND, application and all foreign regulatory applications, Janssen will continue conducting IMbark and the Phase 2 portion of IMerge. Patients currently enrolled in IMbark and the Phase 2 portion of IMerge will continue to receive treatment and follow-up under the respective trial protocols. After September 28, 2018, the effective termination date of the Collaboration Agreement, our responsibility for imetelstat development costs, including ongoing conduct of the extension phase of IMbark and the Phase 2 portion of IMerge, and costs for the prosecution of patents that were licensed to Janssen under the Collaboration Agreement increased from 50% to 100%. In the second quarter of 2018, Janssen informed us that no patients remain on study or in follow-up in the Pilot Study. Therefore, we expect Janssen to close the Pilot Study, and the related IND under which the Pilot Study has been conducted will be inactivated.

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 from Janssen to Geron" included in Item 1A, "Risk Factors" of this Form 10-K.

Other License Agreements

In addition to the above agreement, we have also granted licenses to a number of other organizations in the ordinary course of our business to utilize aspects of our technologies to develop and commercialize products outside of the imetelstat program. These include:

- 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;
- two licenses, both of which will expire in 2019, to companies to use or commercialize telomerase immortalized cells in drug discovery research;
- six licenses, five of which will expire in 2019, to companies to develop and commercialize reagent kits, or to provide services, for the measurement of telomere length or telomerase activity for research purposes;
- a license to a company to develop and commercialize a particular telomerase-based technology for cancer detection; and
- a license to a company for the development of cancer immunotherapies for veterinary applications.

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. We expect revenues under our license agreements related to our telomerase technology to be eliminated by the end of 2019 due to upcoming patent expirations on such technology.

Concentration of Revenues

Our revenues were $1.1 million, $1.1 million and $6.2 million for the years ended December 31, 2018, 2017 and 2016, respectively. See Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations—Revenues" for additional detail regarding the composition of our revenues.

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 accordance with the termination provisions of the Collaboration Agreement, Janssen is required to supply imetelstat drug product to us at Janssen's cost plus a premium for up to 24 months following the termination of the Collaboration Agreement, while we seek to re-establish our own supply chain for clinical manufacturing of imetelstat. During the transition of the imetelstat program from Janssen to us, we plan to engage third-party contractors to perform certain process development and other technical and scientific work with respect to imetelstat, as well as supply starting materials and manufacture drug substance and drug product. 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 from Janssen to Geron" under Item 1A, "Risk Factors".

Consultants

To rebuild our drug development expertise, we have established, and expect to continue to establish, consulting agreements with drug development professionals, clinicians 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 intensely competitive. Other pharmaceutical and biotechnology companies and research organizations currently engage in or have in the past engaged in efforts related to the biological mechanisms related to imetelstat, the study of telomeres, telomerase, or our proprietary oligonucleotide chemistry, and the research and development of therapies for the treatment of hematologic myeloid malignancies. In addition, other products and therapies that could directly compete with imetelstat currently exist or are being developed by pharmaceutical and biopharmaceutical companies and by academic institutions, government agencies and other public and private research organizations.

If approved for commercial sale for the treatment of lower risk MDS, imetelstat would compete against a number of treatment options, including erythropoiesis stimulating agents and other hematopoietic growth factors;

immunomodulators, such as lenalidomide by Celgene Corporation, or Celgene,; hypomethylating agents, such as azacitidine by Celgene and decitabine by Janssen; in addition to investigational treatments that may be further along in development than imetelstat, such as oral versions of azacitidine; histone deacetylase inhibitors; TGF-beta superfamily inhibitors, such as luspatercept by Acceleron Pharma, Inc., or Acceleron, in collaboration with Celgene; PI3 Kinase inhibitors; proteasome inhibitors; aminopeptidase inhibitors, such as tosedostat by CTI Biopharma Corporation, or CTI Biopharma; TLR2-specific antibodies; TPO agonists, such as romiplostim by Amgen Inc.; anti-CD33 antibodies; anti-CD38 antibodies, such as daratumumab by Genmab A/S in collaboration with Janssen; anti-CD123 antibodies, such as talacotuzumab by Janssen; antagonists of Toll-like receptor signaling; retinoic acid receptor alpha agonists, such as SY-1425 by Syros Pharmaceuticals; hypoxia-inducible factor prolyl hydroxylase inhibitors, such as roxadustat by FibroGen, Inc.; Fas ligand inhibitors; immune checkpoint regulators; and JAK-STAT pathway inhibitors.

If approved for commercial sale for the treatment of MF, imetelstat would compete against Incyte Corporation's ruxolitinib, or Jakafi®, which is orally administered. In clinical trials, Jakafi® reduced spleen size, abdominal discomfort, early satiety, bone pain, night sweats and itching in MF patients. Recently, there have also been reports of overall survival benefit as well as improvement in bone marrow fibrosis from Jakafi® treatment. 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 erythropoiesis stimulating agents, androgens, danazol, corticosteroids, thalidomide and lenalidomide. There are other investigational treatments for MF further along in development than imetelstat, such as pacritinib by CTI Biopharma, momelotinib by Sierra Oncology, and fedratinib by Celgene, which have reported results from Phase 3 clinical trials. Other investigational treatments for MF include inhibitors of the JAK-STAT pathway, such as NS-018 by NS Pharma, Inc.; histone deacetylase inhibitors; interleukin-3 receptor targeted agents; inhibitors of heat shock protein 90; hypomethylating agents; PI3 Kinase and mTOR inhibitors; anti-fibrosis antibodies, such as PRM-151 from Promedior, Inc.; hedgehog and SMO inhibitors; PIM kinase inhibitors; IAP inhibitors; anti-LOX2 inhibitors; recombinant pentraxin 2 protein; KIP-1 activators; TGF-beta superfamily inhibitors, such as sotatercept and luspatercept by Acceleron, in collaboration with Celgene; FLT inhibitors; BET inhibitors, such as CPI-0610 by Constellation Pharmaceuticals, Inc.; SMAC mimetics, such as LCL161 by Novartis Pharmaceuticals Corporation; and tyrosine kinase inhibitors.

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.

In addition to the above factors, imetelstat will face competition based on:

- product efficacy and safety;
- convenience of product administration;
- cost of manufacturing;
- the timing and scope of regulatory consents;
- status of coverage and reimbursement;
- 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.

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 Approval and Commercialization of Imetelstat” under 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. 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 for 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, or CPMP, 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 both a centralized procedure with which the marketing authorization is recognized in all EU member states and a decentralized procedure, the latter being based on the principle of licensing within one member country followed by mutual recognition by the other member countries.

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.

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 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 will go 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 2019. 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. On January 31, 2019, the U.S. Department of Health and Human Services, Office of Inspector General, proposed modifications to federal Anti-Kickback Statute safe harbors which, among other things, will affect rebates paid by manufacturers to Medicare Part D plans, the purpose of which is to further reduce the cost of drug products to consumers. While a number of these and other proposed measures may require authorization through additional legislation 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 pharmaco-economic 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 that included a number of provisions of importance to the biopharmaceutical industry. Since its enactment, there have been judicial and Congressional challenges to certain aspects of the ACA, as well as recent 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, two 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." On January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain ACA-mandated fees.

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 July 2018, CMS published a 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. While the Texas U.S. District Court Judge, as well as the Trump administration and CMS, have stated that the ruling will have no immediate effect pending appeal of the decision, it is unclear how this decision, 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 2027 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.

Executive Officers of the Company

The following table sets forth certain information with respect to our executive officers as of January 31, 2019:

Name	Age	Position
John A. Scarlett, M.D.	67	President, Chief Executive Officer and Chairman of the Board
Olivia K. Bloom	50	Executive Vice President, Finance, Chief Financial Officer and Treasurer
Melissa A. Kelly Behrs	55	Executive Vice President and Chief Business Officer
Andrew J. Grethlein, Ph.D.	54	Executive Vice President and Chief Operating Officer
Aleksandra Rizo, M.D., Ph.D.	44	Executive Vice President and Chief Medical Officer
Stephen N. Rosenfield, J.D.	69	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.

Melissa A. Kelly Behrs has served as our Executive Vice President and 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 and 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 and 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, 2018, we had 17 full-time employees and one part-time employee. One of our employees holds a Ph.D. degree and seven hold other advanced degrees. Of this current total workforce, three employees were engaged in, or directly supported, our research and development activities, and 15 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.

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 commercial launch is subject to significant risks and uncertainties, including, among other things, our ability to:

- cause the IND for imetelstat to be maintained without such IND being placed on full or partial clinical hold by the FDA;
- generate additional safety and efficacy data from existing and potential future clinical trials of imetelstat, providing a positive benefit-risk profile that supports 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;
- develop clinical plans for, and successfully enroll and complete, potential future clinical trials of imetelstat in hematologic myeloid malignancies, including the Phase 3 portion of IMerge;
- collaborate successfully with clinical trial sites, academic institutions, clinical research organizations, physician investigators and other third parties;
- obtain 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 CRO, 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 and distribution 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;
- maintain and enforce adequate intellectual property protection for imetelstat;

- maintain adequate financial resources and personnel to advance imetelstat to and through potential future clinical trials, regulatory approval and commercial launch; and
- obtain funding necessary to fund our operations and to advance the development of imetelstat on commercially reasonable terms, including completion of the Phase 3 portion of IMerge and potential clinical development of other indications.

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.

Commencement of potential future clinical trials of imetelstat, including the Phase 3 portion of IMerge, and completion of the extension phase of IMbark and the Phase 2 portion of IMerge, could be interrupted, further delayed or abandoned for a variety of reasons.

Currently, there are two active clinical trials of imetelstat, the extension phase of IMbark and the Phase 2 portion of IMerge. Completion of these clinical trials, and the commencement of any potential future clinical trials of imetelstat, including the Phase 3 portion of IMerge, could be interrupted, delayed or abandoned for a variety of reasons, including as a result of failures or delays in:

- the comprehensive transition of the imetelstat program from Janssen to us, as discussed in more detail under the heading, "Risks Related to Transition of the Imetelstat Program from Janssen to Geron";
- demonstrating sufficient safety and efficacy of imetelstat in IMerge and any 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 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, cause the anticipated commencement of the Phase 3 portion of IMerge to be delayed beyond mid-year 2019 or prevent us from commencing or completing the Phase 3 portion of IMerge;
- maintaining the IND for imetelstat without such IND 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 extension phase of IMbark, including collecting data about serious adverse events and overall survival from the extension phase of IMbark; (ii) completing the Phase 2 portion of IMerge, including assessing the durability of RBC-TI responses; and (iii) designing, enrolling, conducting and completing the Phase 3 portion of IMerge, and promptly or adequately reporting data from such trials;
- determining, after consultations with experts in MF and discussions with regulatory authorities, whether the results from the IMbark primary analysis provide a feasible registration path, if any, for imetelstat in Intermediate-2 or High risk MF patients who have relapsed after or are refractory to prior treatment with a JAK inhibitor;
- 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, including the extension phase of IMbark and the Phase 2 portion of IMerge, and safety or futility findings by the data review committees of potential future clinical trials of imetelstat, such as the Phase 3 portion of IMerge, 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;
- obtaining funding on commercially reasonable terms necessary to advance the development of imetelstat;

- 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 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 manufacturing changes, 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 contract research organizations, laboratory service providers and clinical trial sites, on all aspects of clinical development;
- obtaining timely review and clearances by regulatory authorities of future protocol amendments which may be sought for the Phase 3 portion of IMerge 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, cause the anticipated commencement of the Phase 3 portion of IMerge to be delayed beyond mid-year 2019 or prevent us from commencing or completing the Phase 3 portion of IMerge; and
- obtaining institutional review board or ethics committee approval of 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, cause the anticipated commencement of the Phase 3 portion of IMerge to be delayed beyond mid-year 2019 or prevent us from commencing or completing the Phase 3 portion of IMerge.

Failures or delays with respect to any of these events could adversely affect our ability to continue or successfully complete the extension phase of IMbark or the Phase 2 portion of IMerge or to commence potential future clinical trials of imetelstat, including the Phase 3 portion of IMerge, which could increase development costs, or interrupt, further delay or halt our development or 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.

Imetelstat may cause, or have attributed to it, undesirable or unintended side effects or other adverse events that 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. For example, adverse events and dose-limiting toxicities observed in previous 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;
- liver function test, or LFT, abnormalities, the clinical significance and long-term consequences of which are currently undetermined;
- gastrointestinal events;
- infections;

- muscular and joint pain;
- fatigue; and
- infusion reactions.

Such adverse events and other safety issues, including deaths, were also observed in IMbark and the Phase 2 portion of IMerge. If patients in any potential future clinical trials of imetelstat, including the Phase 3 portion of IMerge, 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 IND 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 continue to receive imetelstat, in the extension phase of IMbark and in the Phase 2 portion of IMerge, 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 extension phase of IMbark and Part 1 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 Janssen, or by us following the transition of the imetelstat program to us 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 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 obtained in prior non-clinical studies and clinical trials do not predict success in later clinical trials. Likewise, preliminary data from clinical trials should be considered carefully and with caution since final data may be materially different from preliminary data, particularly as more patient data become available.

Success in non-clinical testing and early clinical trials does not ensure that later clinical trials will be successful. 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. Product candidates 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. Other 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.

Safety and efficacy data from previous or current imetelstat clinical trials in hematologic myeloid malignancies should not be relied upon as predictive or indicative of future clinical trial results. For example, complete and partial remissions observed in the Pilot Study suggested potential disease-modifying activity of imetelstat in the MF patient population enrolled in 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.

Similarly, in the Phase 2 portion of IMerge, the initial data review for the expansion cohort 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. 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, but we cannot assure you that the combined 8-week RBC-TI rate observed in the Phase 2 portion of IMerge will improve 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, if any, will be comparable to what has been observed in the 13-patient initial cohort, the expansion cohort, or the combined cohorts.

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 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 extension phase of IMbark and the Phase 2 portion of IMerge, efficacy and safety data continue to be generated. Such additional data could result in a lower benefit-risk profile than initially expected, which could hinder the commencement, completion and potential success in the Phase 3 portion of IMerge, or could cause us to abandon further development of imetelstat entirely. Data from the Phase 3 portion, of IMerge could materially differ from the overall conclusions reported for 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.

From time-to-time, safety and efficacy data from previous and current imetelstat clinical trials have been reported or announced by us, clinical investigators or Janssen. For example, preliminary data from the Phase 2 portion of IMerge was presented at the ASH annual meetings in December 2017 and December 2018, and at the EHA annual congress in June 2018. 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.

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:

- the discontinuation of our Phase 2 clinical trial of imetelstat in metastatic breast cancer in September 2012;
- the discontinuation of our development of imetelstat in solid tumors with short telomeres in April 2013;
- Janssen's decisions in the third quarter of 2016 to close the 4.7 mg/kg dosing arm in IMbark to new patient enrollment and to suspend 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;
- Janssen's decision in the third quarter of 2017 to expand the Phase 2 portion of IMerge to enroll additional lower risk MDS patients in a target patient population; and
- Janssen's decision in September 2018 to terminate the Collaboration Agreement.

Further delay, suspension or abandonment of the development of imetelstat in hematologic myeloid malignancies, including further delays resulting from the termination of the Collaboration Agreement, transition of the imetelstat program from Janssen to us, and our ability to successfully plan for and commence future clinical trials of imetelstat, including the Phase 3 portion of IMerge, could have a material adverse effect on the future of imetelstat and our business prospects, and we might cease operations.

If we encounter difficulties enrolling or retaining patients in current or potential future 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 experience difficulties in retaining patients in the extension phase of IMbark, our ability to continue to assess OS would be adversely affected. If we experience difficulties in retaining patients in the Phase 2 portion of IMerge, our ability to continue to assess the durability of RBC-TI responses would be adversely affected. In addition, we may encounter challenges in enrolling and retaining patients in potential future clinical trials of imetelstat, including the Phase 3 portion of IMerge, for a variety of reasons. The enrollment and retention of patients depends on many factors, including:

- 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;
- 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;
- 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, slow progress to later stage clinical trials or personal issues.

In addition, potential future clinical trials of imetelstat, including 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, and this competition will reduce the number and type of patients available to enroll or remain in the 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 future clinical trials of imetelstat, 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 or potential future clinical trials of imetelstat, including 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.

We do not have 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, or in those functional areas that would be required for the successful commercialization of our sole product candidate, imetelstat.

We have no experience in conducting large-scale, late-stage clinical trials, such as the Phase 3 portion of IMerge, nor do we have experience with activities that would be required for the commercialization of imetelstat, should we receive future regulatory approval to do so. We cannot be certain that we will be able to design, 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 require additional financial resources and certain internal development experience that we do not currently possess, 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 also do not have commercialization capabilities. Developing an internal sales, marketing and distribution capability would be 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 conduct 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 will 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 will 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 clinical trials will 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, the CRO we have retained to support our clinical development activities will be critical to our development of imetelstat, including the Phase 3 portion of IMerge, and any failure by our CRO to perform its contractual obligations, or disputes with our CRO about the quality of its performance or other matters, could cause the anticipated commencement of the Phase 3 portion of IMerge to be delayed beyond mid-year 2019 or

prevent us from commencing or completing the Phase 3 portion of IMerge, or could otherwise further delay or halt our imetelstat 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 will 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 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 FROM JANSSEN TO GERON

Encountering delays or difficulties in transitioning the imetelstat program from Janssen to us would prevent us from timely developing imetelstat, or preclude us from developing imetelstat at all, which could severely and adversely affect our financial results, business and business prospects, and might cause us to cease operations.

Under the terms of the Collaboration Agreement, Janssen is required to provide operational support for the imetelstat program during transition of the program to us. The transition process is expected to occur through September 2019, to enable the orderly transfer of all ongoing clinical, regulatory, medical affairs and non-clinical activities to us, including transfer of the sponsorship of ongoing imetelstat clinical trials from Janssen to us. In addition, following the effective date of termination of the Collaboration Agreement, we expect Janssen to supply imetelstat to us for up to 24 months during a transition period for clinical manufacturing and such supply will be charged to us at Janssen's cost plus a premium. Our future clinical development plans for imetelstat substantially depend on the timely and comprehensive transition of the imetelstat program from Janssen to us. Delays in completing the transition activities or unwillingness by Janssen to fully perform all of the transition activities will further delay or preclude the clinical development of imetelstat, increase our operating costs and thereby negatively impact our financial results, as well as harm imetelstat's future prospects, any of which could severely and adversely affect our business and business prospects, and might cause us to cease operations.

During the transition period, we remain dependent on Janssen for several key operational development areas. Poor or incomplete performance by Janssen in these areas could severely and adversely affect imetelstat's future value and our business and business prospects, and might cause us to cease operations.

During the transition period, we will remain dependent on Janssen to perform certain activities related to imetelstat, which subjects us to a number of risks, including:

- Janssen may not perform as expected or required by the Collaboration Agreement, and we are not able to control the amount or timing of the resources that Janssen may devote to the transition;
- there may be disputes between us and Janssen that result in the delay of the transition, or the achievement of development, regulatory and commercial objectives, or affect our license to the proprietary rights

arising under the Collaboration Agreement, which may result in costly litigation or arbitration that diverts our management's attention and resources;

- the manner and timing in which Janssen effects the transition could adversely impact the development of imetelstat;
- failure by Janssen to comply with applicable regulatory guidelines could result in our inability to assume sponsorship responsibility for the IND for imetelstat or to plan for and commence future clinical trials of imetelstat, including the Phase 3 portion of IMerge, or 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 transfer and subsequently maintain the IND for imetelstat and to submit required regulatory reports within required timelines may be compromised if Janssen is not fully cooperative in transferring all data and information from the imetelstat program, including IMbark and IMerge, to us;
- business combinations or significant changes in Janssen's business strategy or failure to apply financial and other resources to the transition may also adversely affect Janssen's ability to perform its obligations related to transition of the imetelstat program to us; and
- Janssen may not properly maintain or defend intellectual property rights arising from the Collaboration Agreement, 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 APPROVAL AND COMMERCIALIZATION OF IMETELSTAT

Maintaining regulatory clearances and approvals to continue the clinical development of imetelstat, and obtaining future regulatory clearances to potentially 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 permit additional imetelstat development or when or if regulatory authorities will approve imetelstat for commercial sale.

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 commercializing imetelstat. Delays in obtaining regulatory clearances and approvals or limitations in the scope of such clearances or approvals could:

- impede or halt our clinical development activities and plans;
- 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. Significant additional research, non-clinical testing and clinical testing is 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 developed in potential future clinical trials, including in Phase 3 clinical trials, 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

future 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 an NDA to the FDA for the initial or other future indications. We may therefore fail to further develop or commercialize imetelstat.

If our interpretation of safety and efficacy data obtained from non-clinical studies and clinical trials varies from interpretations by the FDA or regulatory authorities in other countries, this would likely further delay, limit or prevent further development and approval of imetelstat. For example, the FDA and regulatory authorities in other countries may require more or different data than what has been generated from our non-clinical studies and previous or ongoing clinical trials, even though protocols for these trials may have been reviewed by FDA and any resulting feedback incorporated. In addition, delays or rejections of regulatory approvals, or limitations in marketing authorizations, may be encountered as a result of changes in the regulatory environment or regulatory policy during the period of product development and/or the period of review of any application for regulatory approval for imetelstat.

The benefit-risk profile of imetelstat will also affect the assessment by the FDA and regulatory authorities in other countries of the drug's cost-effectiveness and/or marketability, which assessment could prevent or limit its approval for marketing and successful commercial use. If regulatory submissions requesting approval to market imetelstat are submitted, the FDA and regulatory authorities in other countries may conclude that the overall benefit-risk profile of imetelstat treatment does not merit approval of imetelstat for marketing or further development for any indication. Any of these events could cause us to halt future development and commercialization of imetelstat, if any, which would severely harm our business and business prospects, and might cause us to cease operations.

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, in June 2016, the electorate in the United Kingdom voted in favor of exiting the European Union, and in March 2017, the Government of the United Kingdom initiated the formal procedure of withdrawal from the European Union. 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 changes could adversely affect and/or delay our ability to obtain approval of, and market and sell, imetelstat in the United States. In addition, because imetelstat involves the application of new technologies and a new therapeutic approach, it may be subject to substantial additional review by various government regulatory authorities, and, as a result, the process of obtaining regulatory approvals for imetelstat may proceed more slowly than for product candidates based upon more conventional technologies, and any approval that may be received could limit the use of imetelstat. We do not expect imetelstat to be approved for commercial sale for many years, if at all.

Even if the necessary time and resources are committed by us, the required regulatory clearances and approvals may not be obtained for imetelstat. Further, if regulatory clearances and approvals are obtained to commence commercial sales of imetelstat, they may impose significant limitations on the indicated uses or other aspects of the product label for which imetelstat can be marketed. An approval might also be contingent on the performance of costly additional post-marketing clinical trials. Any failure to advance imetelstat to subsequent clinical trials, failure to obtain regulatory approval of imetelstat, or limitations on any regulatory approval that we might receive, 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, 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 designation received for imetelstat, 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. 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.

Failure to achieve continued compliance with government regulations could delay or halt 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 MANUFACTURING IMETELSTAT

Failure by Janssen to manufacture or provide adequate clinical quantities of imetelstat on a timely basis, or at all, for the period required by the Collaboration Agreement, or our failure to establish 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.

Pursuant to the Collaboration Agreement, Janssen is required to supply imetelstat to us until September 28, 2020 while we are planning to re-establish our own manufacturing supply chain. Consequently, we will remain dependent on Janssen to appropriately supply imetelstat and other clinical trial materials until such date or when we re-establish our own manufacturing supply chain. Thereafter, we will be responsible for the manufacture and supply of imetelstat for future clinical and 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 manufacturers and suppliers;
- supply chain issues, including the timely availability and shelf life requirements of raw materials and other supplies;
- shortage of qualified personnel; 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, Janssen may not perform as agreed or may default in its obligations to supply clinical quantities of imetelstat for the period of time required by the Collaboration Agreement, or may fail to deliver the required quantities of imetelstat on a timely basis, or at required or applicable quality standards, which would result in a further delay or cessation of current and potential future clinical trials and otherwise significantly further delay our ability to develop imetelstat, which would severely and adversely affect our business and business prospects, and might cause us to cease operations. In addition, our inability to establish a manufacturing supply chain capable of providing imetelstat for clinical trials and potential future commercial uses following the termination of Janssen's obligation to supply us with imetelstat would further delay or result in a cessation of potential future clinical trials and 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 future clinical trials of imetelstat, including the Phase 3 portion of IMerge, or to commercialize imetelstat in the future.

Following the termination of Janssen's obligation to supply us with imetelstat, we expect 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. We currently have no arrangements with third parties for the manufacture of imetelstat, and the establishment of such arrangements 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 contract 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 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 completion of current clinical trials, such as the extension phase of IMbark and the Phase 2 portion of IMerge, or the commencement of potential future clinical trials, including the Phase 3 portion of IMerge, 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 hire a number of senior personnel to re-staff our internal drug development group, as well as to contract with subject matter experts in clinical science, biostatistics, clinical operations, pharmacovigilance, quality systems, manufacturing and regulatory affairs, 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 region is particularly intense. Termination of the Collaboration Agreement by Janssen, as well as the previous restructurings we implemented, and the 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 potentially 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 office locations, for example, our planned office opening in northern New Jersey. Such potential 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 anticipated imetelstat development efforts and potential future imetelstat clinical trials, including the Phase 3 portion of IMerge, effectively. If we fail to achieve key development goals, our abilities to grow as a company, and to further develop and 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 or to seek to acquire and/or in-license other oncology products, product candidates, programs or companies in order to diversify our business. Since we do not currently have a discovery function or capabilities, and do not plan to establish such capabilities or to seek to diversify our product candidate portfolio through acquisition and/or in-licensing activity, 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 malignancies, and to potentially commercialize, market and sell imetelstat by ourselves 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 uncertainty regarding the future imetelstat development program, potential collaborative partners may be less willing 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 potential clinical trials in other indications, as well as potential commercialization activities 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 on our own, 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 do not have sufficient funds, we will not be able to advance the imetelstat program, including completing the Phase 3 portion of IMerge or clinical trials in other indications, or 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 early stage 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, 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 could have a material adverse effect on our business.

We have been, and may in the future be, involved in securities-related legal actions that are expensive and time consuming. Any securities-related legal actions, if resolved adversely, could harm our business, financial condition, or results of operations.

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.

We and certain of our officers were named as defendants in two purported class action securities lawsuits filed in the United States District Court for the Northern District of California, or the California District Court, as well as a third securities lawsuit, not styled as a class action, which was transferred to the California District Court. These three cases, or the Class Action Lawsuits, were consolidated for all purposes and settled in July 2017. In connection with the settlement, in April 2017, we paid $250,000 and our insurance providers paid $6.0 million to a settlement escrow account to be paid to members of the settlement class, less payment of attorneys' fees and costs to plaintiff's counsel.

The termination of the Collaboration Agreement could also result in litigation arising out of any claims that our stockholders suffered financial losses. The market price of our common stock declined significantly after the announcement on September 27, 2018 of the termination of the Collaboration Agreement, and certain stockholders experienced significant financial losses. Therefore, it is possible that lawsuits will be filed naming us and/or our officers and directors as defendants with respect to the termination of the Collaboration Agreement by Janssen or other matters related to the Collaboration Agreement, future clinical trials of imetelstat, if any, including the Phase 3 portion of IMerge, or other business activities. 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 any additional lawsuits, and we may not prevail in such lawsuits. Additionally, we may not be successful in having any such lawsuit dismissed or settled within the limits of our insurance coverage.

We have not established any reserve for any potential liability relating to any 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 any such lawsuit, 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. 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.

We may face litigation with Janssen arising from or related to the Collaboration Agreement and Janssen's termination of it. Possible disagreements with Janssen could include disagreements regarding the transition of the imetelstat program from Janssen back to us, or the ownership of proprietary rights arising from the work performed by Janssen under the Collaboration Agreement. We may become involved in performance or other disputes with the CRO we have retained to support our imetelstat clinical development activities, or with other third parties such as service providers, vendors, 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.

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.

RISKS RELATED TO PROTECTING OUR INTELLECTUAL PROPERTY

Our success and the success of our planned future development 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. Our patents may be challenged, invalidated or circumvented, and our patent rights may not provide proprietary protection or competitive advantages to us. In the event that we are unsuccessful in obtaining, maintaining, and enforcing our patents and other intellectual property rights or having our licensors maintain the intellectual property rights we have licensed, the value of our technologies and imetelstat 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 events could impair our ability to sell 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.

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.

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 further 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.

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.

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. For example, on June 13, 2013, the U.S. Supreme Court, or the Court, issued a decision in *Association for Molecular Pathology v. Myriad Genetics, Inc.* holding that claims to isolated genomic DNA were not patentable subject matter, but claims to complementary DNA, or cDNA, molecules were patentable subject matter. 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 patents 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.

In addition, in June 2016, the electorate of the United Kingdom voted to exit the European Union, and in March 2017 the Government of the United Kingdom initiated the formal procedure of withdrawal from the European Union. While the exit of the United Kingdom from the European Union is planned, the exact timing of the withdrawal and the resulting effect of withdrawal 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 our products 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 U.S. Patent and Trademark Office, or 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 Janssen under the Collaboration Agreement, 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, 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, including Janssen, 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.

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, including Janssen, 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 may in the future seek to commercialize imetelstat internationally, 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 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 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 would 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 Janssen has terminated the Collaboration Agreement, we are still subject to indemnification obligations to Janssen under the Collaboration Agreement, 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 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. For example, as we transition the imetelstat program from Janssen to us, we may learn of changes to the imetelstat manufacturing process made by Janssen which would require us to obtain licenses to third party intellectual property rights. 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 for 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 researching, developing, manufacturing or commercializing 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 research, develop, manufacture or commercialize imetelstat would further delay potential future clinical trials of imetelstat and any applications for regulatory approval, impair our ability to sell imetelstat 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), including Janssen, over intellectual property inventorship or ownership, and publications by us, or by investigators, scientific consultants, research collaborators or others 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 collaborative agreements, including our Collaboration Agreement with Janssen which was terminated effective September 28, 2018, 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 and ownership 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 with Janssen or otherwise, 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 will rely on our collaborators, service providers 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 study 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. 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 enacted the California Consumer Privacy Act (CCPA) on June 28, 2018, which takes effect on January 1, 2020. The CCPA gives California residents expanded rights to access and delete their personal information, opt out of certain personal information sharing, and receive detailed information about how their personal information is used. The CCPA provides for civil penalties for violations, as well as a private right of action for data breaches that is expected to increase data breach litigation. 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, which could increase our potential liability and adversely affect our business.

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 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 FINANCIAL POSITION AND NEED FOR ADDITIONAL FINANCING

Our failure to obtain additional capital when needed could force us to further delay, reduce or eliminate development of imetelstat, including the Phase 3 portion of IMerge, or our potential future imetelstat commercialization efforts, 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. 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 completion of the Phase 3 portion of IMerge and potential clinical trials in other indications, and to establish sales and marketing capabilities to commercialize imetelstat in the United States on our own, if regulatory approval is granted. 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 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 future clinical trials, including the Phase 3 portion of IMerge, 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, including 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 meaningfully reduce those manufacturing costs;

- the costs of multiple third-party vendors and service providers, including our CRO, to support the development, manufacturing and commercialization of imetelstat;
- our ability to establish, enforce and maintain collaborative or other strategic arrangements for research, development, clinical testing, manufacturing, commercialization and marketing of imetelstat;
- 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 hire additional qualified employees and consultants to support the development and commercialization of imetelstat;
- the costs and timing of building 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;
- the extent and scope of our general and administrative expenses, including expenses associated with 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 commercial activities for imetelstat. In order to further advance the imetelstat program, including completion of the Phase 3 portion of IMerge and potential clinical trials in other indications, 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 further 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, continued 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, collaboration 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. We will need 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 or potential commercialization of imetelstat, which could adversely affect our business.

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 incur significant additional operating losses and, as we assume responsibility for imetelstat clinical development activities, our operating losses are likely to substantially increase. As of December 31, 2018, our accumulated deficit was approximately $1.01 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 collaborative 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 collaborative agreements related to imetelstat. Any revenues generated from our remaining licensing agreements related to our telomerase technology are expected to be minimal, and will be insufficient to sustain our operations. Our telomerase-related licensing revenues declined significantly in 2018 due to the expiration of the patents underlying such technology, and are expected to be eliminated later in 2019. We have no current plans to enter into any new corporate collaboration, partnership or license agreements that result in revenues, and our remaining telomerase-related license agreements may be terminated by the other parties to such licenses, or expire with the underlying patents.

We also expect to experience increased negative cash flow for the foreseeable future as we fund our operations and assume full payment responsibility for imetelstat clinical development activities. 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 comprehensive U.S. tax reform bill passed in 2017 could adversely affect our business and financial condition.

On December 22, 2017, President Trump signed into law legislation, known as the Tax Cuts and Jobs Act of 2017, that significantly revised the Internal Revenue Code of 1986, as amended, or the Code. The legislation, among other things, contained significant changes to corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%; reduction in the percentage of allowable expenses eligible for orphan drug credit purposes; limitation of the deduction for net operating losses to 80% of current year taxable income and elimination of net operating loss carrybacks; immediate deductions for certain new investments instead of deductions for depreciation expense over time; and modifying or repealing many business deductions and credits. Notwithstanding the reduction in the corporate income tax rate, the overall long-term impact of the federal tax law changes are uncertain and our business and financial condition could be adversely affected. In addition, it is uncertain if and to what extent various states will conform to the federal tax law changes. The impact of this tax reform on holders of our common stock is also uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our common stock.

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

Our net operating loss carryforwards could expire unused and be unavailable to offset future income tax liabilities. Under the 2017 federal income tax law changes, 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 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, 2009 and December 31, 2018, our stock has traded as high as $8.73 per share and as low as $0.86 per share. Between January 1, 2016 and December 31, 2018, 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 for any reason, including as a result of the failure to successfully transition the imetelstat program to us by Janssen, or our inability, for any reason, to successfully continue the development of imetelstat after any such transfer;
- 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, conduct or continue clinical trials of imetelstat in MF, MDS or any additional hematologic myeloid malignancies in a timely manner or at all, or to amend any clinical trial protocol with respect to the anticipated conduct of the Phase 3 portion of IMerge or any potential future clinical trials of imetelstat;
- announcements regarding the safety of imetelstat and partial or full clinical holds placed on the imetelstat IND 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 collaborative arrangements for the development and potential commercialization of imetelstat 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 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 potential future litigation, including any securities class action litigation initiated as a result of the termination of the Collaboration Agreement;
- 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 titled *"We have been, and may in the future be, involved in securities-related legal actions that are expensive and time consuming. Any securities-related legal actions, if resolved adversely, could harm our business, financial condition, or results of operations",* class action litigation has often been instituted against companies, including us, whose securities have experienced periods of volatility in market price. Any such litigation 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 further delays of potential future clinical trials or 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. On December 21, 2018, the closing price of our common stock was $0.98 per share, and while the closing price of our common stock rose to $1.02 per share on December 26, 2018, and has subsequently remained at or above the minimum closing bid price of $1.00 per share from December 26, 2018 through the date of filing of this Annual Report on Form 10-K, it may in the future fall below the closing minimum bid price of $1.00 per share. If the closing bid price of our common stock were to fall 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, 2018, we had 300,000,000 shares of common stock authorized for issuance and 186,392,682 shares of common stock outstanding. In addition, we had reserved 40,665,152 shares of our common stock for future issuance pursuant to our option and equity incentive plans and outstanding warrants as of December 31, 2018. 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 warrants, 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.

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 intensely competitive. Other pharmaceutical and biotechnology companies and research organizations currently engage in or have in the past engaged in efforts related to the biological mechanisms related to imetelstat, the study of telomeres, telomerase, or our proprietary oligonucleotide chemistry, and the research and development of therapies for the treatment of hematologic myeloid malignancies. In addition, other products and therapies that could directly compete with imetelstat currently exist or are being developed by pharmaceutical and biopharmaceutical companies and by academic institutions, government agencies and other public and private research organizations.

If approved for commercial sale for the treatment of lower risk MDS, imetelstat would compete against a number of treatment options, including erythropoiesis stimulating agents and other hematopoietic growth factors; immunomodulators, such as lenalidomide by Celgene Corporation, or Celegene; hypomethylating agents, such as azacitidine by Celgene and decitabine by Janssen; in addition to investigational treatments that may be further along in development than imetelstat, such as oral versions of azacitidine; histone deacetylase inhibitors; TGF-beta superfamily inhibitors, such as luspatercept by Acceleron Pharma, Inc., or Acceleron, in collaboration with Celgene; PI3 Kinase inhibitors; proteasome inhibitors; aminopeptidase inhibitors, such as tosedostat by CTI Biopharma Corporation, or CTI Biopharma; TLR2-specific antibodies; TPO agonists, such as romiplostim by Amgen Inc.; anti-CD33 antibodies; anti-CD38 antibodies, such as daratumumab by Genmab A/S in collaboration with Janssen; anti-CD123 antibodies, such as talacotuzumab by Janssen; antagonists of Toll-like receptor signaling; retinoic acid receptor alpha agonists, such as SY-1425 by Syros Pharmaceuticals; hypoxia-inducible factor prolyl hydroxylase inhibitors, such as roxadustat by FibroGen, Inc.; Fas ligand inhibitors; immune checkpoint regulators; and JAK-STAT pathway inhibitors.

If approved for commercial sale for the treatment of MF, imetelstat would compete against Incyte Corporation's ruxolitinib, or Jakafi®, which is orally administered. In clinical trials, Jakafi® reduced spleen size, abdominal discomfort, early satiety, bone pain, night sweats and itching in MF patients. Recently, there have also been reports of overall survival benefit as well as improvement in bone marrow fibrosis from Jakafi® treatment. 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 erythropoiesis stimulating agents, androgens, danazol, corticosteroids, thalidomide and lenalidomide. There are other investigational treatments for MF further along in development than imetelstat, such as pacritinib by CTI Biopharma, momelotinib by Sierra Oncology, and fedratinib by Celgene, which have reported results from Phase 3 clinical trials. Other investigational treatments for MF include inhibitors of the JAK-STAT pathway, such as NS-018 by NS Pharma, Inc.; histone deacetylase inhibitors; interleukin-3 receptor targeted agents; inhibitors of heat shock protein 90; hypomethylating agents; PI3 Kinase and mTOR inhibitors; anti-fibrosis antibodies, such as PRM-151 from Promedior, Inc.; hedgehog and SMO inhibitors; PIM kinase inhibitors; IAP inhibitors; anti-LOX2 inhibitors; recombinant pentraxin 2 protein; KIP-1 activators; TGF-beta superfamily inhibitors, such as sotatercept and luspatercept by Acceleron, in collaboration with Celgene; FLT inhibitors; BET inhibitors, such as CPI-0610 by Constellation Pharmaceuticals, Inc.; SMAC mimetics, such as LCL161 by Novartis Pharmaceuticals Corporation and other tyrosine kinase inhibitors.

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.

In addition to the above factors, imetelstat will face competition based on:

- product efficacy and safety;
- convenience of product administration;
- cost of manufacturing;
- the timing and scope of regulatory consents;
- status of coverage and level of reimbursement;
- 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 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 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 March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, collectively known as the Affordable Care Act, or ACA, became law and substantially changed the way healthcare is funded by both governmental and private insurers, and significantly impacted the

pharmaceutical industry. The ACA contains a number of provisions that may have a significant impact on our business.

While the Supreme Court upheld the constitutionality of most elements of the ACA in June 2012 and upheld the ACA against challenges to nationwide tax subsidies in July 2015, other judicial and Congressional challenges against the ACA have been brought, and are likely to be brought in the future. 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, two 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". On January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain ACA-mandated fees. 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 July 2018, CMS published a 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. While the Texas U.S. District Court Judge, as well as the Trump administration and CMS, have stated that the ruling will have no immediate effect pending appeal of the decision, it is unclear how this decision, subsequent appeals, and other efforts to repeal and replace the ACA will impact the ACA and our business.

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 2027 unless additional Congressional action is taken. Further, the American Taxpayer Relief Act of 2012, signed into law in January 2013, among other things, also reduced Medicare payments to certain providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

In the future, we anticipate additional proposals relating to the reform of the U.S. healthcare system, some of which could further limit the prices, or the amounts of reimbursement available for imetelstat. There has been increasing legislative and enforcement interest in the United States with respect to 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 drugs, some of which are included in the Trump administration's budget proposal for fiscal year 2019. Additionally, 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. On January 31, 2019, the U.S. Department of Health and Human Services, Office of Inspector General, proposed modifications to federal Anti-Kickback Statute safe harbors which, among other things, will affect rebates paid by manufacturers to Medicare Part D plans, the purpose of which is to further reduce the cost of drug products to consumers. While a number of these and other proposed measures may require authorization through additional legislation 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.

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. 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. Such laws include:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons and entities, including prescription drug manufacturers (or a party acting on its behalf), from knowingly and willfully, directly or indirectly, soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order, lease or recommendation of, any good, facility, item or service for which payment may be made under a federal healthcare program such as Medicare and 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 federal Anti-Kickback Statute has been violated. The 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;

- the federal civil and criminal false claims and civil monetary penalties laws, including the federal civil False Claims Act and its qui tam or whistleblower provisions which permit a private individual to bring an action on behalf of the government to enforce the civil False Claims Act, prohibit, among other things, knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government. 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;

- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which imposes criminal and civil liability for, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, 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 or fraudulent statements 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, which 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, known as covered entities, 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, which requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program, with 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 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; and
- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws, which may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government; 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; state laws that require the reporting of information related to drug pricing; state and local laws that require the registration of pharmaceutical sales representatives; and state and foreign laws governing the privacy and security of health information, including the GDPR, 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 will go into effect beginning 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

In September 2017, we amended the lease agreement for our premises at 149 Commonwealth Drive, Menlo Park, California, to extend the lease term from February 2018 through January 2020. During the term of the amended lease, we will continue to occupy approximately 14,500 square feet of office space. Our amended lease at 149 Commonwealth Drive includes an option to extend the lease for one additional period of two years. In addition, we plan to open an office in northern New Jersey to facilitate the expansion of our clinical development team and to provide support for future global clinical trials. Other corporate functions also expected to be managed from the New Jersey office include business development and, assuming imetelstat is approved, future commercial operations.

ITEM 3. LEGAL PROCEEDINGS

None.

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 1, 2019, there were approximately 542 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, 2018, 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 from Janssen to Geron" and "Risks Related to Regulatory Approval 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 commercialization of innovative therapeutics for hematologic myeloid malignancies. We have global rights to imetelstat, a first-in-class telomerase inhibitor, that was discovered and developed at Geron. We believe clinical data from two Phase 2 clinical trials of imetelstat (IMerge and IMbark, discussed below) conducted by Janssen Biotech, Inc., or Janssen, support further development of imetelstat in hematologic myeloid malignancies. We are working with Janssen to transition the imetelstat program to us. See further discussion below regarding our past and current relationship with Janssen.

We plan to open patient screening and enrollment by mid-year of 2019 in a Phase 3 clinical trial (Part 2 of IMerge) to evaluate imetelstat in transfusion dependent patients with Low or Intermediate-1 risk myelodysplastic syndromes, or MDS, who have relapsed after or are refractory to prior treatment with an erythropoiesis stimulating agent, or ESA, have not received prior treatment with either a hypomethylating agent or lenalidomide and do not have a deletion 5q chromosomal abnormality. This target population of lower risk MDS patients depend on serial red blood cell transfusions to manage symptoms of anemia and fatigue. However, dependency on transfusions is associated with poor survival, because of toxicity due to iron overload, as well as potential infections and allergic reactions. The ultimate goal for most trials of investigational agents in lower risk MDS is to enable patients to

become transfusion independent for as long as possible. In December 2018, we reported results from the Phase 2 portion of IMerge in which 37% 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 high transfusion burdens, an indicator of a more difficult to treat population. Patients enrolled into the Phase 2 portion of IMerge had a baseline median red blood cell transfusion buren 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, such as hypomethylating agents, or HMAs, which have a reported 8-week RBC-TI rate of 17% or lenalidomide, which has a reported 8-week RBC-TI rate of 27%. In addition, among the patients who achieved durable transfusion independence in our trial, as reflected by achieving a 24-week RBC-TI, all showed a hemoglobin rise of ≥3.0 g/dL compared to baseline during the transfusion-free interval. We believe these data suggest potential disease-modifying activity of imetelstat treatment.

Regarding our myelofibrosis, or MF, program, we reported data in December 2018 from the IMbark Phase 2 clinical trial, including the median overall survival of 29.9 months observed in the trial in comparison to the median overall survival of 14 – 16 months for patients previously treated with janus kinase, or JAK, inhibitors. We plan to discuss the IMbark data with experts in MF, as well as regulatory authorities, to consider how these results compare with other therapies currently available to MF patients, and to gain a better understanding of the potential significance of these results to patients and physicians. Because IMbark is the first clinical trial to apply rigorous, objective eligibility criteria to define patients considered relapsed or refractory to JAK inhibitors, we believe feedback from these discussions could provide important information on the feasibility, scope and design, including possible outcome measures, of any potential future clinical trials for imetelstat in Intermediate-2 or High-risk MF patients who have relapsed after or are refractory to prior treatment with a JAK inhibitor. We expect to outline our decision whether to continue late-stage development of imetelstat in MF by the end of the third quarter of 2019. This decision will be influenced by our assessment of what would be required to achieve clinical and regulatory success in MF, including the cost and duration of any potential clinical trials.

We have engaged Parexel as our CRO to support imetelstat clinical development activities. Parexel will provide contract research services related to clinical trials conducted by us, in accordance with the terms of the Master Services Agreement, or the MSA, that we entered into with Parexel on January 30, 2019, and related work orders. We may terminate the MSA and/or any work order without cause on prior written notice to Parexel. Contemporaneously with entering the MSA, we entered into a first work order with Parexel, under which Parexel will provide services related to IMerge. Under the first work order, we will pay Parexel service fees and pass-through expenses estimated to be approximately $33 million in the aggregate for Parexel's services related to IMerge. We may amend the first work order or enter future work orders with Parexel related to MF or future clinical trials or services.

Status of Former Collaboration Agreement with Janssen

On November 13, 2014, we entered into a collaboration and license agreement, or the Collaboration Agreement, 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. Upon the effective date of termination, we regained the global rights to the imetelstat program. As a result of the termination of the Collaboration Agreement, we will not receive any further milestone payments or royalties from Janssen for the development or commercialization of imetelstat, including any clinical development or sales milestones, and Janssen has no further 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.

Under the termination provisions of the Collaboration Agreement, Janssen is required to provide certain operational support for the imetelstat program during transition of the program to us. Each company is responsible for its own costs incurred related to transition activities unless otherwise specified in the Collaboration Agreement. We expect the transition process to be completed by September 2019 to enable the orderly transfer of all ongoing clinical, regulatory, medical affairs and non-clinical activities to us, including transfer of the sponsorship of ongoing imetelstat clinical trials from Janssen to us. In addition, following the effective date of termination of the Collaboration Agreement, we expect Janssen to supply imetelstat to us for up to 24 months during a transition period for clinical manufacturing and such supply will be charged to us at Janssen's cost plus a premium.

Until the sponsorship responsibilities for imetelstat transfer from Janssen to us, including the U.S. Investigational New Drug, or IND, application, and all foreign regulatory applications, Janssen will continue conducting IMbark and the Phase 2 portion of IMerge. Patients currently enrolled in IMbark and the Phase 2 portion of IMerge will continue to receive treatment and follow-up under the respective trial protocols. After September 28, 2018, the effective termination date of the Collaboration Agreement, our responsibility for imetelstat development costs, including ongoing conduct of the extension phase of IMbark and the Phase 2 portion of IMerge, and costs for the prosecution of patents that were licensed to Janssen under the Collaboration Agreement increased from 50% to 100%.

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 from Janssen to Geron" included in Item 1A, "Risk Factors" of this Form 10-K.

Financial Overview

We had approximately $182.1 million in cash, cash equivalents, restricted cash and current and noncurrent marketable securities as of December 31, 2018. 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 on our own, 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, 2018, we had an accumulated deficit of $1.01 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 assume sole responsibility for 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, 2018. Financial instruments classified as Level 2 include commercial paper, corporate notes and equity investments, representing approximately 96% of our total financial instruments classified as assets measured at fair value as of December 31, 2018. 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.

Revenue Recognition

On January 1, 2018, we adopted the provisions of Accounting Standards Codification Topic 606, *Revenue from Contracts with Customers*, or Topic 606, 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, 2018 are presented under Topic 606, while prior period amounts have not been adjusted and continue to be reported in accordance with our historical accounting under Accounting Standards Codification Topic 605, *Revenue Recognition*, or Topic 605, and therefore, there is a lack of comparability to the prior periods presented. In connection with the adoption of Topic 606, we recognized a cumulative-effect adjustment to our opening balance of

accumulated deficit and an increase to interest and other receivables as of January 1, 2018 for projected sales-based royalties on product sales occurring in 2017 for which payments had not yet been received as of December 31, 2017. Such royalties were recognized as revenue in prior periods when payments were received from our licensees.

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 further 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, 2018, we have not made any revisions to revenue recognition estimates.

Clinical Trial Accruals

For the clinical development activities being conducted by Janssen under the former Collaboration Agreement, we monitor patient enrollment levels and related activities to the extent possible through discussions with Janssen personnel and base our estimates of clinical trial costs on the best information available at the time. However, additional information may become available to us which would allow us to make a more accurate estimate in future periods. In this 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, especially in light of the termination of the Collaboration Agreement with Janssen effective September 28, 2018. 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 further 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 assume 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 transition of the imetelstat program from Janssen to us, 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 $641,000, $667,000 and $5.6 million in 2018, 2017 and 2016, respectively, related to our various agreements. The decrease in license fee revenues in 2018 compared to 2017 primarily reflects a reduction in the number of active license agreements in 2018 for research licenses related to our human telomerase reverse transcriptase, of hTERT, technology. The decrease in license fee revenues in 2017 compared to 2016 primarily reflects the full recognition of an upfront payment of $5 million from Janssen

Pharmaceuticals, Inc., or Janssen Pharmaceuticals, under a license agreement that was executed in September 2016, or the License Agreement, related to license rights to commercialize products based on specialized oligonucleotide backbone chemistry and novel amidates for 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. See further discussion of revenue recognition under and description of the terms of the License Agreement in Note 4 on License Agreements in Notes to Financial Statements of this annual report on Form 10-K.

We recognized royalty revenues of $425,000, $398,000 and $537,000 in 2018, 2017 and 2016, respectively, on product sales of telomerase detection and telomere measurement kits to the research-use-only market and cell-based research products. 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. The decrease in royalty revenues in 2017 compared to 2016 primarily reflects lower product sales by our licensees.

In 2018, the majority of our revenues were from license fees and royalties under licenses granted to several biotechnology and pharmaceutical companies to use telomerase immortalized cells in drug discovery research and for drug discovery applications. Two customers accounted for approximately 59% and 39% of our 2018 and 2017 revenues, respectively. The upfront payment from Janssen Pharmaceuticals represented approximately 81% of our 2016 revenues.

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 be lower in 2019 than in previous years, and to be eliminated by the end of 2019, due to upcoming patent expirations on such technology. In addition, due to the termination of the Collaboration Agreement effective September 28, 2018, we will not receive any further 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, 2018, 2017 and 2016, 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 years ended December 31, 2018, 2017 and 2016, 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 $13.4 million, $11.0 million and $18.0 million for the years ended December 31, 2018, 2017 and 2016, respectively. 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. The decrease in research and development expenses in 2017 compared to 2016 primarily reflects lower direct external costs for our proportionate share of clinical development expenses under the collaboration with Janssen and reduced personnel related expenses.

Research and development expenses for the years ended December 31, 2018, 2017 and 2016 were as follows:

	Year Ended December 31,		
(In thousands)	2018	2017	2016
Direct external research and development expenses:			
Clinical program: Imetelstat	$ 10,353	$ 8,437	$ 14,695
Personnel related expenses	2,429	2,063	2,729
All other research and development expenses	650	533	623
Total	$ 13,432	$ 11,033	$ 18,047

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 substantially increase in future periods as we assume sole responsibility for the imetelstat development program, including any ongoing or potential future clinical trials, engage third parties, such as Parexel International (IRL) Limited, or Parexel, our CRO, 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 is required to provide operational support for the imetelstat program, including continuing to conduct ongoing imetelstat clinical trials, during transition of the program to us. We reimburse 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, are being incurred by each company, unless otherwise specified in the Collaboration Agreement. We expect the transition process to be completed by September 2019. In addition, following the effective date of termination of the Collaboration Agreement, we expect Janssen to supply imetelstat to us for up to 24 months during a transition period for clinical manufacturing and such supply will be charged to us at Janssen's cost plus a premium.

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 Approval 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 $18.7 million, $19.3 million and $18.8 million for the years ended December 31, 2018, 2017 and 2016, respectively. 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 prosecution expenses. The increase in general and administrative expenses in 2017 compared to 2016 primarily reflects higher non-cash stock-based compensation expense, an increased allocation of facilities and other overhead costs to general and administrative activities and higher consulting costs, partially offset by lower legal costs. We expect general and administrative expenses to substantially increase in the future since the cost sharing between Janssen and us for patent prosecution expenses related to the imetelstat program ceased upon termination of the Collaboration Agreement and we expect to hire additional personnel to support our research and development activities for imetelstat.

Interest and Other Income

Interest and other income was $3.3 million, $1.4 million and $1.2 million for the years ended December 31, 2018, 2017 and 2016, respectively. The increase in interest and other income in 2018 compared to 2017 primarily reflects higher yields on our marketable securities portfolio and the increase in the size of our marketable securities portfolio in 2018 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. The increase in interest income in 2017 compared to 2016 primarily reflects higher yields on our marketable securities portfolio. 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 incurred in 2017 or 2016.

Change in Fair Value of Equity Investment

With the adoption of ASU 2016-01 on January 1, 2018, as described in the sub-section entitled, "New Accounting Pronouncements – Recently Adopted" in Note 1 on Organization and Summary of Significant Accounting Policies in Notes to Financial Statements of this annual report on Form 10-K, 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. For the year ended December 31, 2018, the overall decrease in the fair value of our equity investment in Sienna resulting from observable price changes in Sienna's stock was $541,000. No comparable amounts were incurred in 2017 or 2016. 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 $154,000, $77,000 and $83,000 for the years ended December 31, 2018, 2017 and 2016, respectively. Other expense reflects the 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 year ended December 31, 2018 included losses of $63,000 related to foreign currency translation for our equity investment in Sienna. No comparable amounts were incurred in 2017 or 2016. 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, 2018, we had cash, restricted cash, cash equivalents and marketable securities of $182.1 million, compared to $109.2 million at December 31, 2017. The net increase in cash, restricted cash, cash equivalents, and current and noncurrent marketable securities in 2018 was the net result of the receipt of net cash proceeds of approximately $86.0 million from sales of our common stock under the 2015 Sales Agreement and the 2018 Sales Agreement and cash proceeds of $6.9 million from the exercise of outstanding stock options, partially offset by cash being used for operations. 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 assume responsibility for the 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. From January 2018 through April 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. From May 2018 through July 2018, we sold an aggregate of 10,083,079 shares of our common stock under the 2018 Sales Agreement, resulting in net cash proceeds to us of approximately $38.4 million after deducting sales commissions and offering expenses payable by us. As of December 31, 2018, approximately $60.5 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 and clinical and regulatory activities necessary to bring imetelstat to market, such as completion of the Phase 3 portion of IMerge and potential clinical trials in other indications, and to establish sales and marketing capabilities to commercialize imetelstat in the United States on our own, if regulatory approval is granted. 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 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 future clinical trials, including the Phase 3 portion of IMerge, 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, including 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 meaningfully reduce those manufacturing costs;
- the costs of multiple third-party vendors and service providers, including our CRO, to support the development, manufacturing and commercialization of imetelstat;
- our ability to establish, enforce and maintain collaborative or other strategic arrangements for research, development, clinical testing, manufacturing, commercialization and marketing of imetelstat;
- 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 hire additional qualified employees and consultants to support the development and commercialization of imetelstat;

- the costs and timing of building 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;
- the extent and scope of our general and administrative expenses, including expenses associated with 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 commercial activities for imetelstat. In order to further advance the imetelstat program, including completion of the Phase 3 portion of IMerge and potential clinical trials in other indications, 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 further 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, continued 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. We will need 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 or potential commercialization of imetelstat, which could adversely affect our business.

Cash Flows from Operating Activities

Net cash used in operations was $21.0 million, $20.6 million and $18.4 million in 2018, 2017 and 2016, respectively. 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. The increase in net cash used in operations in 2017 compared to 2016 primarily reflects the net result of the receipt of the $5 million upfront payment from Janssen Pharmaceuticals under the License Agreement in 2016, partially offset by lower payments to Janssen in 2017 under the cost-sharing arrangement for imetelstat clinical development.

Cash Flows from Investing Activities

Net cash used in investing activities in 2018 was $77.7 million. Net cash provided by investing activities in 2017 and 2016 was $23.0 million and $8.8 million, respectively. The increase in net cash used in investing activities in 2018 compared to 2017 primarily reflects a higher rate of purchases than maturities of marketable securities in 2018 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. The increase in net cash provided by investing activities in 2017 compared to 2016 primarily reflects a higher rate of maturities than purchases of marketable securities in 2017.

For the three years ended December 31, 2018, we purchased approximately $73,000 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 2018, 2017 and 2016 was $93.0 million, $1.1 million and $1.2 million, respectively. The increase in net cash provided by financing activities in 2018 compared to 2017 primarily reflects 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 exercise of stock options under our equity plans. The decrease in net cash provided by financing activities in 2017 compared to 2016 primarily reflects the net result of the receipt of higher cash proceeds in 2016 from the exercise of outstanding stock options under our equity plans, partially offset by the receipt of net cash proceeds in 2017 from the sales of our common stock pursuant to the 2015 Sales Agreement with MLV. See Note 7 on Stockholders' Equity for additional information about the 2015 Sales Agreement with MLV and the 2018 Sales Agreement with B. Riley FBR.

Significant Cash and Contractual Obligations

As of December 31, 2018, 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	$ 22	$ 11	$ 11	$ —	$ —
Operating lease[2]	757	699	58	—	—
License fees[3]	185	50	30	30	75
Total contractual cash obligations	$ 964	$ 760	$ 99	$ 30	$ 75

(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 2017, we amended the lease agreement for our premises at 149 Commonwealth Drive, Menlo Park, California, to extend the lease term from February 2018 through January 2020. Our amended lease at 149 Commonwealth Drive includes an option to extend the lease for one additional period of two years. Operating lease obligations in the table above do not assume the exercise by us of the option to extend the lease or any right of termination.

(3) License fees are comprised of minimum annual license payments under our existing license agreements with several 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, 2018 and 2017, the related statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, 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, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, 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, 2018, 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 7, 2019 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 7, 2019

GERON CORPORATION

BALANCE SHEETS

	December 31, 2018	December 31, 2017
	(In thousands, except share and per share data)	
ASSETS		
Current assets:		
Cash and cash equivalents	$ 10,575	$ 16,335
Restricted cash	269	268
Marketable securities	152,714	78,351
Interest and other receivables	1,168	436
Prepaid assets	1,332	580
Total current assets	166,058	95,970
Noncurrent marketable securities	18,582	14,241
Property and equipment, net	59	102
Other assets	585	—
	$ 185,284	$ 110,313
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 982	$ 503
Accrued compensation and benefits	2,642	3,385
Amount due to Janssen Biotech, Inc.	2,610	1,702
Accrued liabilities	1,317	926
Total current liabilities	7,551	6,516
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, $0.001 par value; 3,000,000 shares authorized; no shares issued and outstanding at December 31, 2018 and 2017	—	—
Common stock, $0.001 par value; 300,000,000 shares authorized; 186,392,682 and 159,877,239 shares issued and outstanding at December 31, 2018 and 2017, respectively	186	160
Additional paid-in capital	1,189,194	1,089,684
Accumulated deficit	(1,011,464)	(985,840)
Accumulated other comprehensive loss	(183)	(207)
Total stockholders' equity	177,733	103,797
	$ 185,284	$ 110,313

See accompanying notes.

GERON CORPORATION

STATEMENTS OF OPERATIONS

	Year Ended December 31,		
	2018	2017	2016
	(In thousands, except share and per share data)		
Revenues:			
License fees and royalties	$ 1,066	$ 1,065	$ 6,162
Operating expenses:			
Research and development	13,432	11,033	18,047
General and administrative	18,707	19,287	18,761
Total operating expenses	32,139	30,320	36,808
Loss from operations	(31,073)	(29,255)	(30,646)
Interest and other income	3,291	1,416	1,192
Gain on settlement	1,460	—	—
Change in fair value of equity investment	(541)	—	—
Other expense	(154)	(77)	(83)
Net loss	$ (27,017)	$ (27,916)	$ (29,537)
Basic and diluted net loss per share	$ (0.15)	$ (0.18)	$ (0.19)
Shares used in computing basic and diluted net loss per share	176,504,996	159,224,986	159,045,644

See accompanying notes.

GERON CORPORATION

STATEMENTS OF COMPREHENSIVE LOSS

	Year Ended December 31,		
	2018	2017	2016
		(In thousands)	
Net loss	$ (27,017)	$ (27,916)	$ (29,537)
Net unrealized gain (loss) on marketable securities	24	(154)	160
Comprehensive loss	$ (26,993)	$ (28,070)	$ (29,377)

See accompanying notes.

GERON CORPORATION

STATEMENTS OF STOCKHOLDERS' EQUITY

	Common Stock		Additional Paid-In	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Capital	Deficit	Loss	Equity
	(In thousands, except share data)					
Balances at December 31, 2015	158,781,359	$ 159	$1,070,567	$ (928,387)	$ (213)	$ 142,126
Net loss	—	—	—	(29,537)	—	(29,537)
Other comprehensive income	—	—	—	—	160	160
Stock-based compensation related to issuance of common stock and options in exchange for services	21,541	—	156	—	—	156
Issuances of common stock under equity plans	355,736	—	1,169	—	—	1,169
Stock-based compensation for equity-based awards to employees and directors	—	—	8,245	—	—	8,245
401(k) contribution	—	—	61	—	—	61
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

See accompanying notes.

GERON CORPORATION

STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2018	2017	2016
		(In thousands)	
Cash flows from operating activities:			
Net loss	$ (27,017)	$ (27,916)	$ (29,537)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and amortization	59	76	81
Loss (gain) on retirement/sales of property and equipment	—	5	(16)
Accretion and amortization on investments, net	(978)	273	552
Change in fair value of equity investment, including foreign currency translation	604	—	—
Stock-based compensation for services by non-employees	191	200	156
Stock-based compensation for employees and directors	6,368	8,144	8,245
Amortization related to 401(k) contributions	9	32	61
Changes in assets and liabilities:			
Interest and other receivables	(528)	39	731
Prepaid assets	(752)	(56)	123
Accounts payable	479	278	65
Accrued compensation and benefits	(743)	542	(183)
Amount due to Janssen Biotech, Inc.	908	(1,665)	1,039
Accrued liabilities	391	(508)	314
Net cash used in operating activities	(21,009)	(20,556)	(18,369)
Cash flows from investing activities:			
Purchases of property and equipment	(16)	—	(57)
Proceeds from sales of property and equipment	—	—	16
Purchases of marketable securities	(188,365)	(100,006)	(129,250)
Proceeds from maturities of marketable securities	110,663	122,976	138,054
Net cash (used in) provided by investing activities	(77,718)	22,970	8,763
Cash flows from financing activities:			
Proceeds from issuances of common stock under equity plans	6,951	51	1,169
Proceeds from issuances of common stock from financings	86,017	1,060	—
Net cash provided by financing activities	92,968	1,111	1,169
Net (decrease) increase in cash, cash equivalents and restricted cash	(5,759)	3,525	(8,437)
Cash, cash equivalents and restricted cash at the beginning of the period	16,603	13,078	21,515
Cash, cash equivalents and restricted cash at the end of the period	$ 10,844	$ 16,603	$ 13,078

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 commercialization of innovative therapeutics for hematologic myeloid malignancies. We have global rights to imetelstat, a first-in-class telomerase inhibitor, that 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 is required to provide certain operational support for the imetelstat program during transition of the program to us. The transition process is expected to occur through September 2019. Each company is responsible for costs incurred related to transition activities unless otherwise specified in the Collaboration Agreement. 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, the prior period presentation of cash and cash equivalents in the statements of cash flows has been updated to conform with current period presentation. See "New Accounting Pronouncements – Recently Adopted" in this Note 1 for further discussion of the adoption of ASU No. 2016-18. In addition, the prior period presentation of certain cash flows from financing activities 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 2018, 2017 and 2016, the diluted net loss per share calculation excludes potential dilutive securities of 27,823,845, 22,946,422 and 19,663,180, 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, 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, 2018, 2017 and 2016. 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 our investment in equity securities at fair value 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. See "New Accounting Pronouncements – Recently Adopted" in this Note 1 for additional information on the adoption of ASU 2016-01.

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. See "New Accounting Pronouncements – Recently Adopted" in this Note 1 for further discussion of the adoption of Topic 606.

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, 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.

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 collaborations. 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 collaboration partners and research-related overhead. Research and development costs are expensed as incurred, including costs incurred under our collaboration and/or license agreements.

Until the sponsorship responsibilities for imetelstat transfer from Janssen to us, including the U.S. Investigational New Drug, or IND, application and all foreign regulatory applications, Janssen will continue conducting ongoing clinical trials of imetelstat during the transition of the program to us. For the clinical development activities being conducted by Janssen under the Collaboration Agreement, which was terminated effective September 28, 2018, we monitor patient enrollment levels and related activities to the extent possible through discussions with Janssen personnel and base our estimates of clinical trial costs on the best information available at the time. However, additional information may become available to us which would allow us to make a more accurate estimate in future periods. In this 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 7 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, 2018 and 2017 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. Two customers accounted for approximately 59% and 39% of our 2018 and 2017 revenues, respectively. Approximately 81% of our 2016 revenues represented an upfront payment from Janssen Pharmaceuticals, Inc., or Janssen Pharmaceuticals, in connection with a license agreement signed in September 2016, or the License Agreement.

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 May 2014, the Financial Accounting Standards Board, or FASB, issued ASU No. 2014-09, which amends the guidance for accounting for revenue from contracts with customers. This ASU superseded the revenue recognition requirements in Accounting Standards Codification Topic 605, *Revenue Recognition*, or Topic 605, and created Topic 606.

We adopted Topic 606 on January 1, 2018 using the modified retrospective transition method for those agreements which were not completed as of January 1, 2018. Financial results for the reporting periods beginning after January 1, 2018 are presented under Topic 606, while prior period amounts have not been adjusted and continue to be reported in accordance with our historical accounting under Topic 605.

In connection with the adoption of Topic 606, we recognized a cumulative-effect adjustment to our opening balance of accumulated deficit and an increase to interest and other receivables of $204,000 as of January 1, 2018 for projected sales-based royalties on product sales occurring in 2017 for which payments had not yet been received as of December 31, 2017. Such royalties were recognized as revenue in prior periods when payments were received from our licensees. In accordance with Topic 606-10-50-14a, we have elected to exclude providing further information about our sales-based royalties.

The adoption of Topic 606 did not result in any changes to the estimated transaction price or the performance obligations for current agreements or the amounts allocated to satisfied performance obligations. We do not have any deferred revenue associated with unsatisfied performance obligations. Since we view our operations as a single segment and all of our revenues are recognized at a point in time from similar license agreements, disaggregated revenue disclosures would not materially provide additional information. In 2018, the application of Topic 606 did not have a material impact on our financial results in comparison to results that would have been realized if we had continued to apply Topic 605. Additionally, 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 results that would have been realized if we had continued to apply Topic 605.

In January 2016, the FASB issued ASU 2016-01 which requires equity investments to be measured at fair value with changes in fair value recognized in the statements of operations. To further clarify ASU 2016-01, the FASB issued ASU No. 2018-03, *Technical Corrections and Improvements to Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*, or ASU 2018-03, in February 2018. ASU 2018-03 requires application of a prospective transition approach only for those equity investments for which the new measurement alternative is being applied. We adopted ASU 2016-01 and ASU 2018-03 on January 1, 2018 using the modified retrospective transition method and recognized a cumulative-effect adjustment to our opening balance of accumulated deficit and other assets for the fair value of our equity investment in Sienna Cancer Diagnostics Limited, or Sienna. In accordance with ASU 2016-01, we remeasured the fair value of our equity investment in Sienna at each reporting date in 2018 and included the change in fair value resulting from observable price changes in change in fair value of equity investment and the change in fair value resulting from foreign currency translation in other expense in our statements of operations. See Note 2 on Fair Value Measurements for additional information on our equity investment in Sienna.

The cumulative-effect adjustments to our January 1, 2018 balance sheet for the adoption of Topic 606 and ASU 2016-01 and ASU 2018-03 were as follows (in thousands):

Balance Sheet	Balance at December 31, 2017	Adjustments Due to Topic 606	Adjustments Due to ASU 2016-01 and ASU 2018-03	Balance at January 1, 2018
Assets:				
Interest and other receivables	$ 436	$ 204	$ —	$ 640
Other assets	$ —	$ —	$ 1,189	$ 1,189
Stockholders' Equity:				
Accumulated deficit	$ (985,840)	$ 204	$ 1,189	$ (984,447)

As of January 1, 2018, we also adopted ASU No. 2016-15, *Classification of Certain Cash Receipts and Cash Payments*, ASU No. 2016-18, *Statement of Cash Flows (Topic 230) Restricted Cash*, and ASU No. 2017-09, *Compensation — Stock Compensation: Scope of Modification Accounting*. With the adoption of ASU No. 2016-18, changes in the total of cash, cash equivalents and restricted cash are presented in our statements of cash flows. The adoption of these new standards did not have a material impact on our financial statements and related disclosures.

New Accounting Pronouncements – Issued But Not Yet Adopted

In February 2016, the 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. Certain quantitative and qualitative disclosures about leasing arrangements also are required. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early adoption is permitted. The updated guidance requires a modified retrospective adoption. 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 ASU 2016-02 on January 1, 2019 using the modified retrospective method as allowed under ASU 2018-11 by recording a cumulative-effect adjustment to the opening balance of retained earnings on January 1, 2019. In evaluating the impact of adopting the new lease guidance, we have determined that our current operating lease for our office space will require us to record an asset and an obligation for the arrangement of approximately $719,000 upon adoption of ASU 2016-02. We have also evaluated other rental and equipment service contracts and believe such agreements do not contain any embedded lease arrangements. We will elect the practical expedients upon transition that will retain the lease classification and initial direct costs for any leases that existed prior to the adoption of these standards.

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*, for the purpose of clarifying certain aspects of ASU 2016-13. ASU 2018-19 has the same effective date and transition requirements as ASU 2016-13. ASU 2016-13 will be effective for fiscal years beginning after December 15, 2019, using a modified retrospective approach. Early adoption is permitted. We do not expect the adoption of this standard to have a material impact on our financial statements.

In June 2018, the FASB issued ASU 2018-07, *Improvements to Nonemployee Share-Based Payment Accounting*, or ASU 2018-07, to simplify 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. There are no new disclosure requirements. The new guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early adoption is permitted, including in an interim period for which financial statements have not been issued. We adopted ASU 2018-07 on January 1, 2019. Since all of our share-based payments to nonemployees were fully vested as of the adoption date, we do not anticipate that the adoption of ASU 2018-07 will 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,* 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. While we continue to assess the potential impact of this standard, we do not expect the adoption of this standard to have a material impact on our financial statements.

In August 2018, the Securities and Exchange Commission issued Release No. 33-10532 that amends and clarifies certain financial reporting requirements. The principal change to our financial reporting will be the inclusion of the annual disclosure requirement of changes in stockholders’ equity in Rule 3-04 of Regulation S-X to interim periods. We will adopt this new rule beginning with our financial reporting for the quarter ending March 31, 2019. Upon adoption, we will include a Statement of Stockholders’ Equity with each quarterly filing on Form 10-Q.

In November 2018, the FASB issued ASU 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606*. 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 given the termination of the Collaboration Agreement in September 2018.

2. FAIR VALUE MEASUREMENTS

Cash Equivalents and Marketable Securities

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, restricted cash and marketable securities by security type at December 31, 2017 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	$ 11,030	$ —	$ —	$ 11,030
Commercial paper	2,242	—	—	2,242
Corporate notes	1,750	—	(1)	1,749
	$ 15,022	$ —	$ (1)	$ 15,021
Restricted cash:				
Certificate of deposit	$ 268	$ —	$ —	$ 268
Marketable securities:				
Government-sponsored enterprise securities (due in less than one year)	$ 12,500	$ —	$ (40)	$ 12,460
Commercial paper (due in less than one year)	10,928	4	(1)	10,931
Corporate notes (due in less than one year)	55,067	—	(107)	54,960
Corporate notes (due in one to two years)	14,303	—	(62)	14,241
	$ 92,798	$ 4	$ (210)	$ 92,592

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, 2018 and 2017 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, 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)
As of December 31, 2017:						
Government-sponsored enterprise securities (due in less than one year)	$ —	$ —	$ 12,460	$ (40)	$ 12,460	$ (40)
Commercial paper (due in less than one year)	7,717	(1)	—	—	7,717	(1)
Corporate notes (due in less than one year)	55,210	(106)	1,499	(2)	56,709	(108)
Corporate notes (due in one to two years)	14,241	(62)	—	—	14,241	(62)
	$ 77,168	$ (169)	$ 13,959	$ (42)	$ 91,127	$ (211)

The gross unrealized losses related to government-sponsored enterprise securities, commercial paper and corporate notes as of December 31, 2018 and 2017 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, 2018 and 2017 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, 2018 and 2017 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, 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
As of December 31, 2017:				
Money market funds[1]	$ 11,030	$ —	$ —	$ 11,030
Government-sponsored enterprise securities[2]	—	12,460	—	12,460
Commercial paper[1][2]	—	13,173	—	13,173
Corporate notes[1][2][3]	—	70,950	—	70,950
Total	$ 11,030	$ 96,583	$ —	$ 107,613

(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 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, as described in Note 1 on Organization and Summary of Significant Accounting Policies, our equity investment in Sienna must be reported at fair value and therefore, we recorded a cumulative-effect adjustment of $1,189,000 on our balance sheet for the fair value of our shares in Sienna, as measured using the closing stock price reported on the ASX and converted to U.S. dollars as of January 1, 2018. In accordance with ASU 2016-01, we remeasure the fair value of our shares in Sienna at the end of each reporting period, and as of December 31, 2018, the fair value of our shares in Sienna was $585,000, resulting in a decrease in fair value of $604,000 for the year ended December 31, 2018, including a loss of $63,000 related to foreign currency translation.

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, 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)	2018	2017
Furniture and computer equipment	$ 727	$ 711
Leasehold improvements	111	111
	838	822
Less accumulated depreciation and amortization	(779)	(720)
	$ 59	$ 102

4. LICENSE AGREEMENTS

Janssen Biotech, Inc. Collaboration and License Agreement

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. Upon the effectiveness of the Collaboration Agreement, we received $35,000,000 from Janssen as an upfront payment, which we classified as deferred revenue upon receipt.

Under the Collaboration Agreement, Janssen was wholly responsible for the development, manufacturing, seeking regulatory approval for and commercialization of, imetelstat worldwide. Janssen has been conducting two clinical trials of imetelstat: a Phase 2 trial in myelofibrosis, referred to as IMbark, and a Phase 2/3 trial in myelodysplastic syndromes, referred to as IMerge. Development costs for IMbark and IMerge were shared between us and Janssen on a 50/50 basis. Additionally, under the terms of the Collaboration Agreement, we remained responsible for prosecuting, at Janssen's direction, the patents licensed to Janssen at the time we entered into the Collaboration Agreement, with costs shared between us and Janssen on a 50/50 basis. The cost-sharing arrangement with Janssen began in January 2015.

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 plan to continue development of imetelstat on our own. As a result of the termination of the Collaboration Agreement, we will not receive any further milestone payments or royalties from Janssen for the development or commercialization of imetelstat, including any clinical development or sales milestones, and Janssen has no further obligations to us or any third parties, such as clinical sites or vendors, to fund any potential future imetelstat clinical trials. Under the termination provisions of the Collaboration Agreement, Janssen is required to provide certain operational support for the imetelstat program during transition of the program to us. The transition process is expected to occur through September 2019 to enable the orderly transfer of all ongoing clinical, regulatory, medical affairs and non-clinical activities to us, including the transfer of the sponsorship of ongoing imetelstat clinical trials from Janssen to us. Each company is responsible for costs incurred related to transition activities unless otherwise specified in the Collaboration Agreement. In addition, Janssen is expected to supply imetelstat to us for up to 24 months during a transition period for clinical manufacturing and such supply will be charged to us at Janssen's cost plus a premium. Until the sponsorship responsibilities for imetelstat transfer from Janssen to us, including the U.S. Investigational New Drug, or IND, application and all foreign regulatory applications, Janssen will continue conducting ongoing clinical trials of imetelstat. After September 28, 2018, the effective termination date of the Collaboration Agreement, our responsibility for imetelstat development costs, including continuing conduct of ongoing clinical trials of imetelstat, and costs for the prosecution of patents that were licensed to Janssen under the Collaboration Agreement increased from 50% to 100%. As of December 31, 2018, the amount due to Janssen of $2,610,000 on our balance sheet

primarily represents the amount owed to Janssen for operational support of the imetelstat program for the three months ended December 31, 2018.

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.

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.

Under the terms of the License Agreement, Janssen Pharmaceuticals, at its sole expense, is required to use reasonable efforts to perform research, development and commercialization activities to obtain at least one licensed product to be researched, developed and commercialized under the License Agreement. 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. 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.

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.

The license rights granted to Janssen Pharmaceuticals are the only performance obligation for us under the License Agreement. In addition, we concluded that Janssen Pharmaceuticals can use and benefit from the license rights without any further performance from us due to their specific knowledge of oligonucleotide chemistry, and sufficient capital to independently research, develop and commercialize products under the License Agreement on a global basis. Accordingly, we fully recognized the $5,000,000 upfront payment from Janssen Pharmaceuticals as license fee revenue on our statements of operations in the third quarter of 2016 upon the completion of the transfer of the license rights to Janssen Pharmaceuticals.

We have determined that each of the additional potential development and regulatory milestone payments to us under the License Agreement represent fully constrained variable consideration under Topic 606 as achievement of these milestones has not been deemed probable as of December 31, 2018. Consequently, we will recognize revenue for each of these payments in their entirety once the assessment of probability of achievement of the related milestone becomes probable. Royalties on potential future product sales under the License Agreement will be recognized as revenue when the related sales occur.

5. ACCRUED LIABILITIES

Accrued liabilities consisted of the following:

	December 31,	
(In thousands)	2018	2017
Professional legal and accounting fees	$ 327	$ 272
Clinical trial costs	529	516
Other	461	138
	$ 1,317	$ 926

6. COMMITMENTS AND CONTINGENCIES

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.

Operating Lease Commitment

On September 21, 2017, we amended the lease agreement for our premises at 149 Commonwealth Drive, Menlo Park, California, to extend the lease term from February 2018 through January 2020. As of December 31, 2018, operating lease obligations under the amended lease agreement include aggregate future minimum payments of approximately $757,000, of which payments of approximately $699,000 and $58,000 are due in 2019 and 2020, respectively. Rent expense under our operating leases was approximately $703,000, $691,000 and $708,000 for the years ended December 31, 2018, 2017 and 2016, respectively.

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, 2018, 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. 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. From January 2018 through April 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. From May 2018 through July 2018, we sold an aggregate of 10,083,079 shares of our common stock pursuant to the 2018 Sales Agreement, resulting in net cash proceeds to us of approximately $38,366,000 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, 2018, 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.

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 2018, we have not repurchased any shares under the 2011 Plan. As of December 31, 2018, we have no shares outstanding subject to repurchase under the 2011 Plan.

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 2018, we have not repurchased any shares under the 2018 Plan. As of December 31, 2018, we have no shares outstanding subject to repurchase under the 2018 Plan.

As of December 31, 2018, 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. 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. As of December 31, 2018, we had not granted any awards under the Inducement 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. As of December 31, 2018, we have not issued any shares under the Directors Market Plan.

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, 2017	6,202,727	22,408,529	$ 2.96		
Additional shares authorized	14,000,000	—	$ —		
Options granted	(9,265,000)	9,265,000 (1)	$ 2.07		
Awards granted	(139,652)	—	$ —		
Options exercised	—	(3,144,878)	$ 2.20		
Options cancelled/forfeited/expired	1,166,324	(1,242,699)	$ 3.48		
Balance at December 31, 2018	11,964,399	27,285,952 (1)	$ 2.72	6.71	$ —
Options exercisable at December 31, 2018		16,464,746	$ 3.13	5.10	$ —
Options fully vested and expected to vest at December 31, 2018		26,293,625	$ 2.75	6.61	$ —

(1) Includes 4,500,000 performance-based stock options 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 $1.00 per share as of December 31, 2018, 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 2018, 2017 or 2016. As of December 31, 2018, 2017 and 2016, there were 16,464,746, 17,249,032 and 14,074,457 exercisable options outstanding at weighted average exercise prices per share of $3.13, $3.03 and $2.99, respectively.

The total pretax intrinsic value of stock options exercised during 2018, 2017 and 2016 was $8,812,000, $15,000 and $595,000, respectively. Cash received from the exercise of options in 2018, 2017 and 2016 totaled approximately $6,929,000, $18,000 and $493,000, respectively.

Information about stock options outstanding as of December 31, 2018 is as follows:

	Options Outstanding		
Exercise Price Range	Number of Shares	Weighted Average Exercise Price Per Share	Weighted Average Remaining Contractual Life (In years)
$1.10 - $1.72	10,290,050	$ 1.61	7.04
$1.73 - $2.45	7,144,384	$ 2.27	7.65
$2.54 - $5.01	8,055,105	$ 3.95	6.06
$5.09 - $7.31	1,796,413	$ 5.33	4.03
$1.10 - $7.31	27,285,952 (1)	$ 2.72	6.71

(1) Includes 4,500,000 performance-based stock options that have not achieved certain strategic milestones.

Aggregate restricted stock activity for the 2011 Plan and the 2018 Plan is as follows:

	Number of Shares	Weighted Average Grant Date Fair Value Per Share	Weighted Average Remaining Contractual Term (In years)
Non-vested restricted stock at December 31, 2017	—	$ —	—
Granted	73,980	$ 1.91	
Vested	(73,980)	$ 1.91	
Non-vested restricted stock at December 31, 2018	—	$ —	—

The weighted average grant date fair value of restricted stock granted during the years ended December 31, 2018, 2017 and 2016 was $1.91, $2.20 and $2.44 per share, respectively. The total fair value of restricted stock that vested during 2018, 2017 and 2016 was $141,000, $159,000 and $54,000, respectively.

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, 2018, an aggregate of 123,092 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, 2018, 2017 and 2016 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 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 year ended December 31, 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, 2018, 2017 and 2016 which was allocated as follows:

	Year Ended December 31,		
(In thousands)	2018	2017	2016
Research and development	$ 949	$ 988	$ 1,275
General and administrative	5,419	7,156	6,970
Stock-based compensation expense included in operating expenses	$ 6,368	$ 8,144	$ 8,245

The fair value of stock options granted in 2018, 2017 and 2016 has been estimated at the date of grant using the Black Scholes option-pricing model with the following assumptions:

	Year Ended December 31,		
	2018	2017	2016
Dividend yield	0%	0%	0%
Expected volatility range	0.821 to 0.990	0.884 to 0.892	0.888 to 0.890
Risk-free interest rate range	2.55% to 3.11%	1.98% to 1.99%	1.21% to 1.38%
Expected term range	5.25 - 6.62 yrs	5.5 yrs	5.5 yrs

The fair value of employee stock purchases in 2018, 2017 and 2016 has been estimated using the Black Scholes option-pricing model with the following assumptions:

	Year Ended December 31,		
	2018	2017	2016
Dividend yield	0%	0%	0%
Expected volatility range	0.437 to 0.475	0.577 to 0.641	0.641 to 0.684
Risk-free interest rate range	1.53% to 1.76%	0.45% to 0.89%	0.28% to 0.45%
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, 2018, 2017 and 2016 was $1.52, $1.58 and $1.83 per share, respectively. The weighted average estimated fair value of employees' purchase rights for the years ended December 31, 2018, 2017 and 2016 was $0.56, $0.75 and $1.01 per share, respectively. As of December 31, 2018, 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 $8,814,000, which is expected to be recognized over the next 27 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. Prior to 2014, our board of directors approved matching contributions for the Geron 401K Plan in our common stock, which vested ratably over four years for each year of service completed by our employees, commencing from the date of hire.

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. In addition, we will record any increase in the fair value of the stock options and restricted stock awards as the respective equity award vests. We recorded stock-based compensation expense of $50,000, $41,000 and $104,000 for the vested portion of the fair value of stock options and restricted stock awards held by consultants in 2018, 2017 and 2016, respectively.

We have also issued common stock to non-employee directors and consultants. For stock issuances where services are to be performed for us, we record a prepaid asset equal to the fair market value of the shares on the date of issuance and amortize the fair value of the shares to our operating expenses on a pro-rata basis as services are performed. For stock issuances where services have been performed for us, we record the fair market value of the shares on the date of issuance to offset the amounts owed. In 2018, 2017 and 2016, we issued 73,980, 72,066 and 21,541 shares of common stock, respectively, in exchange for services provided. In 2018, 2017 and 2016, we recognized approximately $141,000, $159,000 and $52,000, respectively, of expense in connection with stock grants to non-employee directors and consultants.

Common Stock Reserved for Future Issuance

Common stock reserved for future issuance as of December 31, 2018 is as follows:

Outstanding stock options	27,285,952
Options and awards available for grant	11,964,399
Employee stock purchase plan	876,908
Warrant outstanding	537,893
Total	40,665,152

8. 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,	
	2018	2017
	(In thousands)	
Net operating loss carryforwards	$ 192,100	$ 187,700
Research credits	35,500	34,300
Capitalized research and development	2,500	2,500
License fees	—	100
Other-net	7,000	8,200
Total deferred tax assets	237,100	232,800
Valuation allowance for deferred tax assets	(237,100)	(232,800)
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 $4,300,000 and $9,600,000 for the years ended December 31, 2018 and 2016, 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 2018 because our net deferred tax assets have been fully offset by a valuation allowance.

As of December 31, 2018, we had domestic federal net operating loss carryforwards of approximately $816,800,000. Of this, $788,500,000 will expire at various dates beginning in 2019 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, 2018, we had state net operating loss carryforwards of approximately $294,800,000 expiring at various dates beginning in 2028 through 2038, if not utilized. We also had federal research and development tax credit carryforwards of approximately $35,500,000 expiring at various dates beginning in 2019 through 2038, if not utilized. Our state research and development tax credit carryforwards of approximately $19,200,000 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 deferred tax assets and correspondingly reduced the valuation allowance by approximately $102,300,000. 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, 2018, we had approximately $16,400,000 of unrecognized tax benefits, none of which would currently affect our effective tax rate if recognized due to our 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, 2017	$ 15,900
Decrease related to prior year tax positions	(100)
Increase related to current year tax positions	600
Balance as of December 31, 2018	$ 16,400

If applicable, we would classify interest and penalties related to uncertain tax positions in income tax expense. Through December 31, 2018, 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, 2019. 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.

9. STATEMENTS OF CASH FLOWS DATA

	Year Ended December 31,		
	2018	2017	2016
		(In thousands)	
Supplemental investing activities:			
Net unrealized gain (loss) on marketable securities	$ 24	$ (154)	$ 160

We have not made any cash payments for taxes or interest for the years ended December 31, 2018, 2017 and 2016.

10. SELECTED QUARTERLY FINANCIAL INFORMATION (UNAUDITED)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share amounts)			
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)
Year Ended December 31, 2017:				
Revenues	$ 537	$ 174	$ 163	$ 191
Operating expenses	8,031	6,905	7,407	7,977
Net loss	(7,183)	(6,405)	(6,899)	(7,429)
Basic and diluted net loss per share	$ (0.05)	$ (0.04)	$ (0.04)	$ (0.05)

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.

11. SUBSEQUENT EVENT

We have engaged Parexel as our contract research organization to support imetelstat clinical development activities. Parexel will provide contract research services related to clinical trials conducted by us, in accordance with the terms of the Master Services Agreement, or the MSA, that we entered into with Parexel on January 30, 2019, and related work orders. We may terminate the MSA and/or any work order without cause on prior written notice to Parexel. Contemporaneously with entering the MSA, we entered into a first work order with Parexel, under which Parexel will provide services related to IMerge. Under the first work order, we will pay Parexel service fees and pass-through expenses estimated to be approximately $33 million in the aggregate for Parexel's services related to IMerge.

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, 2018.

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, 2018 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, 2018. The effectiveness of our internal control over financial reporting as of December 31, 2018 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, 2018, 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, 2018, 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, 2018 and 2017, the related statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes and our report dated March 7, 2019 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 7, 2019

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 2019, 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.

Section 16(a) Compliance

Information concerning Section 16(a) beneficial ownership reporting compliance is incorporated by reference from the section captioned "Section 16(a) Beneficial Ownership Reporting Compliance" contained in the Proxy Statement.

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	Amended and Restated Bylaws of Registrant	3.1	8-K	March 19, 2010	000-20859
3.4	Amendment to Amended and Restated Bylaws of Registrant	3.4	8-K	November 22, 2017	000-20859
4.1	Form of Common Stock Certificate	4.1	10-K	March 15, 2013	000-20859
4.2	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

		Incorporation by Reference			
Exhibit Number	Description	Exhibit Number	Filing	Filing Date	File No.
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*				
10.12	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*				
10.14	Form of Performance-Vesting Stock Option Agreement under 2018 Equity Incentive Plan*				
10.15	Form of Performance-Vesting Stock Option Agreement under 2018 Equity Incentive Plan, as amended*				
10.16	2018 Inducement Award Plan*	10.1	8-K	December 14, 2018	000-20859
10.17	2018 Inducement Award Plan, as amended*				
10.18	Form of Stock Option Agreement under 2018 Inducement Award Plan*	10.2	8-K	December 14, 2018	000-20859
10.19	Form of Stock Option Agreement under 2018 Inducement Award Plan, as amended*				
10.20	Form of Performance-Vesting Stock Option Agreement under 2018 Inducement Award Plan*				
10.21	2014 Employee Stock Purchase Plan*	10.1	8-K	May 23, 2014	000-20859
10.22	Non-Employee Director Compensation Policy, as amended February 11, 2016*	10.30	10-K	March 10, 2016	000-20859
10.23	Non-Employee Director Compensation Policy, as amended January 31, 2018*	10.31	10-K	March 16, 2018	000-20859
10.24	Non-Employee Director Compensation Policy, as amended May 15, 2018*	10.5	8-K	May 18, 2018	000-20859
10.25	Non-Employee Director Compensation Policy, as amended October 1, 2018*	10.2	10-Q	November 1, 2018	000-20859
10.26	Non-Employee Director Compensation Policy, as amended January 30, 2019*				
10.27	Directors' Market Value Stock Purchase Plan, effective October 1, 2018*	10.1	10-Q	November 1, 2018	000-20859
10.28	Amended and Restated Severance Plan, effective as of January 30, 2019*				

		Incorporation by Reference			
Exhibit Number	Description	Exhibit Number	Filing	Filing Date	File No.
10.29	Amended and Restated Employment agreement between the Registrant and John A. Scarlett, M.D., effective as of January 31, 2019*				
10.30	Amended and Restated Employment agreement between the Registrant and Stephen N. Rosenfield, effective as of January 31, 2019*				
10.31	Amended and Restated Employment agreement between the Registrant and Andrew J. Grethlein, effective as of January 31, 2019*				
10.32	Amended and Restated Employment agreement between the Registrant and Olivia K. Bloom, effective as of January 31, 2019*				
10.33	Amended and Restated Employment agreement between the Registrant and Melissa A. Kelly Behrs, effective as of January 31, 2019*				
10.34	Employment Agreement between the Registrant and Aleksandra K. Rizo, effective as of January 15, 2019*				
10.35†	California Institute for Regenerative Medicine Notice of Loan Award	10.1	10-Q	November 3, 2011	000-20859
10.36†	Office Lease Agreement by and between the Registrant and Exponent Realty, LLC, effective as of February 29, 2012	10.36	10-K/A	March 27, 2012	000-20859
10.37	Fifth Amendment to Office Lease Agreement by and between the Registrant and Exponent Realty, LLC, effective as of September 15, 2015	10.1	8-K	September 18, 2015	000-20859
10.38	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
10.39	At Market Issuance Sales Agreement, dated August 28, 2015, by and between the Registrant and MLV & Co. LLC	10.1	8-K	August 28, 2015	000-20859
10.40	At Market Issuance Sales Agreement, dated May 18, 2018, by and between Geron Corporation and B. Riley FBR, Inc.	10.1	8-K	May 18, 2018	000-20859
10.41†	Collaboration and License Agreement by and between the Registrant and Janssen Biotech, Inc., dated November 13, 2014	10.36	10-K	March 11, 2015	000-20859
10.42#	Master Services Agreement by and between the Registrant and Parexel International (IRL) Limited, dated January 30, 2019				

		Incorporation by Reference			
Exhibit Number	Description	Exhibit Number	Filing	Filing Date	File No.
10.43#	Work Order No. 1 under Master Services Agreement by and between the Registrant and Parexel International (IRL) Limited, dated January 30, 2019				
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 7, 2019				
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 7, 2019				
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 7, 2019**				
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 7, 2019**				
101	The following materials from the Registrant's annual report on Form 10-K for the year ended December 31, 2018, formatted in Extensible Business Reporting Language (XBRL) include: (i) Balance Sheets as of December 31, 2018 and 2017, (ii) Statements of Operations, Comprehensive Loss, Stockholders' Equity and Cash Flows for each of the three years in the period ended December 31, 2018, 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.

Confidential treatment has been requested 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 7, 2019

By: /s/ OLIVIA K. 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 7, 2019
/s/ OLIVIA K. BLOOM OLIVIA K. BLOOM	Executive Vice President, Finance, Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)	March 7, 2019
/s/ DANIEL M. BRADBURY DANIEL M. BRADBURY	Director	March 7, 2019
/s/ KARIN EASTHAM KARIN EASTHAM	Director	March 7, 2019
/s/ V. BRYAN LAWLIS V. BRYAN LAWLIS	Director	March 7, 2019
/s/ SUSAN M. MOLINEAUX SUSAN M. MOLINEAUX	Director	March 7, 2019
/s/ ROBERT J. SPIEGEL ROBERT J. SPIEGEL	Director	March 7, 2019

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-3, No. 333-171611) and in the related prospectuses and prospectus supplements,
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 and No. 333-161035) 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 7, 2019, 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, 2018.

/s/ Ernst & Young LLP

Redwood City, California
March 7, 2019

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 7, 2019

/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 7, 2019

/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, 2018 (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 7, 2019

/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, 2018 (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 7, 2019

/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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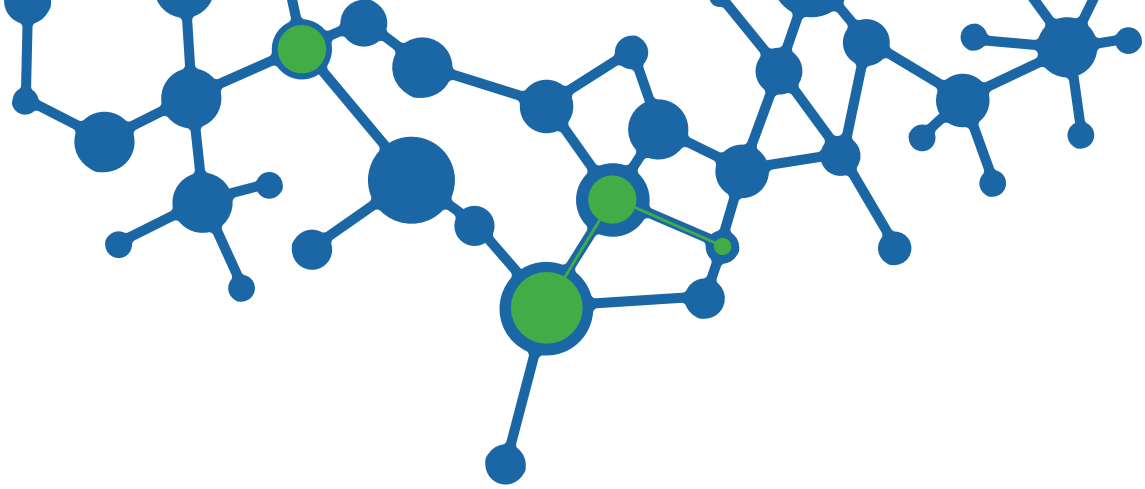


Use of Forward-Looking Statements

Except for statements of historical fact, the statements contained in this annual report and letter to stockholders are forward-looking statements made pursuant to the Safe Harbor provisions of the Private Securities Litigation Reform Act of 1995. These include, without limitation, statements regarding the expectations, plans, timelines and prospects for imetelstat and Geron, including without limitation, that: (i) the imetelstat IND is on track to transfer from Janssen to Geron by the end of the second quarter of 2019; (ii) Geron plans to commence screening and enrollment of the Phase 3 portion of IMerge by mid-year 2019; (iii) Geron expects top-line results for the Phase 3 portion of IMerge by mid-year 2022; (iv) Geron will outline a decision regarding late-stage development in myelofibrosis by the end of the third quarter 2019; (v) imetelstat has potential clinical benefit and may have a role to play in lower risk MDS; (vi) overall survival data from the Phase 2 IMbark clinical trial suggest a meaningful survival outcome in relapsed/refractory MF patients; and (vii) other statements that are not historical facts, constitute forward-looking statements. These statements involve risks and uncertainties that can cause actual results to differ materially from those in such forward-looking statements. These risks and uncertainties, include, without limitation, whether: (i) contingencies delay or prevent both the start of the Phase 3 portion of IMerge by mid-year 2019 and top-line results by mid-year 2022; (ii) regulatory authorities permit the further development of imetelstat for MF or MDS on a timely basis, or at all; (iii) there is a delay in Geron's decision regarding future development of imetelstat for myelofibrosis; (iv) any circumstances arise that prevent a timely transition of the IND and imetelstat program from Janssen; (v) imetelstat demonstrates that it is safe and efficacious; (vi) any future efficacy or safety results may cause the benefit-risk profile of imetelstat to become unacceptable; (vii) Geron's patents protect the commercial opportunity of imetelstat; and (viii) Geron can obtain sufficient funding to support further development of imetelstat. Additional information and factors that could cause actual results to differ materially from those in the forward-looking statements are contained in Geron's periodic reports filed with the Securities and Exchange Commission under the heading "Risk Factors," including Geron's annual report on Form 10-K for the year ended December 31, 2018. Undue reliance should not be placed on forward-looking statements, which speak only as of the date they are made, and the facts and assumptions underlying the forward-looking statements may change. Except as required by law, Geron disclaims any obligation to update these forward-looking statements to reflect future information, events or circumstances.

CORPORATE INFORMATION

Board of Directors

John A. Scarlett, M.D.
Chairman of the Board

Dawn C. Bir

Daniel M. Bradbury

Karin Eastham

V. Bryan Lawlis, Ph.D.

Susan M. Molineaux, Ph.D.

Elizabeth G. O'Farrell

Robert J. Spiegel, M.D., FACP

Officers

John A. Scarlett, M.D.
Chairman of the Board, President and Chief Executive Officer

Olivia K. Bloom
Executive Vice President, Finance, Chief Financial Officer and Treasurer

Melissa A. Kelly Behrs
Executive Vice President and Chief Business Officer

Andrew J. Grethlein, Ph.D.
Executive Vice President and Chief Operating Officer

Aleksandra Rizo, M.D., Ph.D.
Executive Vice President and Chief Medical Officer

Stephen N. Rosenfield, J.D.
Executive Vice President, Chief Legal Officer and Corporate Secretary

Investor Relations

Suzanne Messere
investor@geron.com - email

CG Capital
(877) 889-1972 - tel

Transfer Agent & Registrar

Computershare
P.O. Box 505000
Louisville, KY 40233
(800) 962-4284 - tel

Independent Auditors

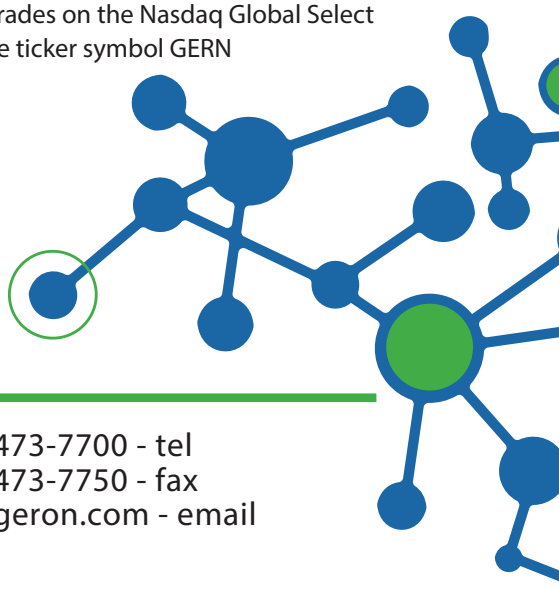
Ernst & Young LLP
275 Shoreline Drive
Suite 600
Redwood City, CA 94065

Legal Counsel

Cooley LLP
3175 Hanover Street
Palo Alto, CA 94304

Stock Listing

Geron Corporation
common stock trades on the Nasdaq Global Select Market under the ticker symbol GERN



geron

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